P910 Series

Preface

The P910 Series White Paper is designed to give the reader a deeper understanding of the features and applications of the P910 series smartphones.

There are four basic models in the P910 series:

- Standard P910i (Europe, Middle East and Africa)

- P910a (850 MHz version for North and Latin America)

- P910i Chinese (Taiwan, Hong Kong and Singapore)

- P910c (People's Republic of China)

For an overview of the different models, refer to 'P910 Series Models' on page 6.

When describing general features and functions common to all models, this document uses the term 'P910i'. In other words, in these cases 'P910i' refers to any P910 series model.

Since the P910c and P910i Chinese have most features and specifications in common, whenever the term 'Chinese models' is used in this document it refers to P910c as well as to P910i Chinese.

The specifics and additional features of the Chinese models are described in more detail in the section Chinese Models in Detail on page 110.

The paper has four main sections:

This document describes the features and functionality of the latest software releases available at the time of publication.

Please note that features, specifications and User Interface (UI) design are subject to change.

Content

P910 Series Overview

Key Features

- Large TFT touch screen with 262,144 colours.
- QWERTY style keyboard on the inside of the flip, supporting text input in flip open applications.
- Built-in stylus for touchscreen operation.
- Up to 64 MB of user data.
- Memory Stick Duo™/PRO Duo™ slot for up to 1 GB removable memory.
- Prepared for Push email.
- Editors for Microsoft Excel and Word.
- Viewers for PDF and PowerPoint files (PowerPoint viewer on CD).
- Free upgrade of system software using Sony Ericsson Update Service.
- 5-way Jog Dial for rapid selection of many of the functions.
- Integrated digital camera for still pictures and video clip recording.
- Video and audio players (including an MP3 Music Player).
- Office Handsfree (speaker phone) function.
- Corporate Telephony
- Voice dial, voice answer, and 'magic word' activation.
- Multimedia Messaging (MMS), SMS, EMS and email.
- Combined Web and WAP browser.
- High speed data communications using GPRS.
- Personal Organizer with Contacts, Calendar, Tasks, Jotter for notes and sketches, Sound recorder and Calculator.
- Games with widescreen and sound capabilities.
- Support for TTY devices.
- Bluetooth™, Infrared, and USB connectivity.
- Bluetooth car handsfree profile.
- PC and remote synchronisation (SyncML).
- Easy personalization of appearance and tones using Themes.
- M-Services and MeT (Mobile electronic Transactions).
- Flight mode
- Tri-band communication giving international operation.
- Symbian OS 7.0 Platform: C++ and Java™ SDKs.

P910 Series Models

There are four basic models of the P910 series smartphone:

Standard P910i

- Europe, Middle East, Americas, Latin Asia
- Latin characters (a, b, c…) on the flip keyboard and numeric keypad
- Russian numeric keypad available
- Flip closed input by Multitap or T9™
- Latin character handwriting recognition

P910i Chinese

- Hong Kong, Taiwan and Singapore
- Chinese keypads and T9 input method, Latin characters on the flip keyboard
- Chinese handwriting recognition
- Chinese dictionary
- Lunar calendar

P910a

- North and Latin America
- GSM 850 MHz
- Latin characters (a, b, c…) on the flip keyboard and numeric keypad
- Flip closed input by Multitap or T9™
- Latin character handwriting recognition

P910c

- People's Republic of China
- Chinese keypad and T9 input method, Latin characters on the flip keyboard
- Chinese handwriting recognition
- Client for online Chinese dictionary
- Lunar calendar

Sony Ericsson Update Service

Users can update the system software in their P910 series phones. When new software is available it can be downloaded via internet using the Sony Ericsson Update Service.

Note: when updating the system software, user data will be lost. You should always make a full back-up of the phone before updating the software.

To update the P910i firmware:
1) Connect the SyncStation to your PC.

2) Visit the Sony Ericsson P910i customer support site on the Internet.

3) Download the Sony Ericsson Update Service application and run it.

When the new software is installed and the phone has been restarted, previous files and settings can be restored from the back-up.

P910i Controls and Operation

The P910i has a large touchscreen and a flip containing a flip keyboard. This provides fast and convenient one-handed operation with the flip closed plus large touchscreen sophistication with the flip open.

Screen visible with the flip closed is 208 x 208 pixels

CommuniCorder key – single press access to the camera application

Browser key – single press access to the browser application

Flip with numeric keypad on the outside and QWERTY style keyboard on the inside

Memory Stick slot (under cover)

Stylus – inserts into the body of the phone

Stereo headset socket with cover

External aerial connector (under protective cap)

UP

Camera lens

BACKWARDS   FORWARDS

Loudspeaker grille

SELECT (inwards press)

5-way Jog Dial   DOWN

Mirror for taking self-portrait

Infrared 'eye'

Battery cover

On/Off switch

Charger Connector

Accessory Connector

Flip Closed (FC mode)

With the flip closed, known as 'flip closed' or FC mode, the P910i can be used like a conventional mobile telephone with the added benefit of Jog Dial.

Flip Closed Views

Rotating the Jog Dial up or down takes the user through a menu of the most important applications. Pressing the Jog Dial inwards or pressing the OK key will open the application.

The standby screen may be personalized with still or animated photographs.

Pressing the Menu key brings up a set of options relevant for the active application. The Jog Dial may be used to select an operation, or the corresponding key on the flip may be pressed as a shortcut.

During a phone call, the user has access to most applications, making it possible to look up appointments, contacts and so on while talking on the phone.

The Standard P910i and P910a enable Latin characters to be entered via the keys on the flip. Characters are selected by pressing the key until the required one is shown (multitap) or by using predictive text input according to the T9™ method. The P910c and other Chinese language versions of the P910i support Chinese character input using Stroke, Pinyin and Bopomofo. Refer to Chinese Models in Detail on page 110 for more details.

Flip Open (FO mode)

When the flip is opened, it is possible to switch between the three text entry modes: Flip keyboard, the on-screen keyboard and handwriting.

The stylus may be used to navigate and enter data on the screen. The Jog Dial provides further navigation and selection capability. The User Interface is Symbian's established UIQ design, adapted for the narrower 208-pixel screen.

The stylus is used to operate the touchscreen and enter text – the stylus is stored in a slot at the top of the phone.

The illustration on the left shows the large 208 x 320 pixel colour touchscreen.

The flip keyboard is similar to a computer keyboard making it quick and simple to enter text when writing, for example, notes or email.
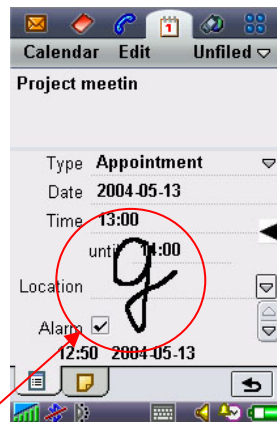
Text may be entered using natural handwriting over the whole screen. Lower case letters are entered below the ◀ symbol, uppercase in line with it and numbers above it.
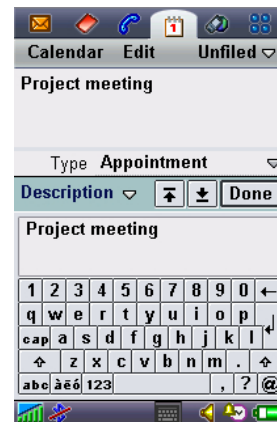
An on-screen keyboard is also available when required by tapping on the keyboard icon in the status bar. Symbol and special character keyboards may be selected when required. Cut, Copy and Paste functions are also available here.

In FO mode, the Chinese models offer Stroke, Pinyin or Bopomofo input methods plus Chinese character recognition. Numeric and English characters can also be entered using the character recognition.

Flip Removal

The flip may be removed for operation without the key pad and flip keyboard. In this case, the phone operates in flip open mode only, with the addition of an optional virtual flip.

User Interface Outline

P910i applications generally follow the style guidelines established for Symbian UIQ applications.
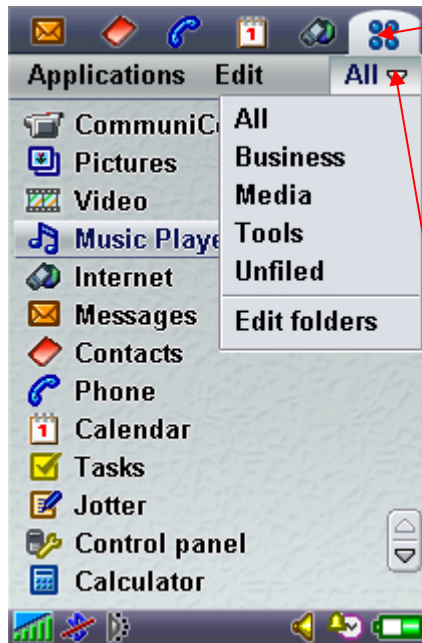
The icons across the top of the screen are used for rapid selection of five applications: The user may personalize which application shortcuts should be available in this area. The sixth icon always switches to the Application Launcher.

All the available applications are listed in the Application Launcher. The user may select list view with small icons and text, or an icon display of eight applications per page. One tap on an icon will launch (switch to) the desired application. The user may personalize the FO Application launcher background.

The Folder feature enables the user to group applications into logical folders such as 'Business' and 'Media'. This feature is carried through into many applications, enabling contacts, appointments, notes and so on to be organized effectively.

Applications are not actually started or closed; the user simply switches between them. When an application is used for the first time, it will start in its default state, which is typically a list view. When the user navigates away from an application, its settings, for example, type of view and current folder, are automatically saved and ready for the next time the application is used. Data is always saved, for example, a partly composed message is saved as a draft.

Here is an example of an application – the Music player. The music titles shown in the lower part of the screen are those available from all the folders in both the internal (phone memory) and external memory (Memory Stick Duo/PRO Duo if used).

Tapping on the folder drop-down, the list can be filtered to show just one folder, for example, Classical or Pop, as seen in this image:
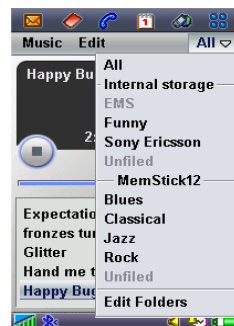
As in the application launcher, the Jog Dial can be used to select an item. This provides a useful 'one-handed' method of operation.

This is the detail view in the Contacts application. The most important information is displayed on the first tab as a summary. Further information is organized on the other tabs; in this case notes and a picture.

A conventional menu structure is provided for tasks and actions.

Changing the folder here will re-classify this entry. Entries default to 'unfiled'.

Tapping on a telephone number will navigate to the phone application to make a call. Similarly, tapping an email address will navigate to the email application and create a new email to the contact. For mobile numbers, there are shortcut icons for creating SMS or MMS messages.

Management functions such as delete, Copy to SIM or Send as are performed in detail view.

Status Bar

The status bar has a couple of standard items that are always visible, such as signal strength and battery meters. In FO mode, the icons may be tapped to see further information and access relevant settings. Tapping the keyboard icon while entering text enables the user to switch between handwriting recognition and on-screen keyboard. The keyboard icon is only present when using applications where text entering is possible. More icons are used to indicate temporary conditions such as Bluetooth activity, ongoing call and Internet connection status.

Signal strength and GPRS availability

On-screen Keyboard

Battery status

Temporary status indicators: new email message, Bluetooth and infrared shown here.
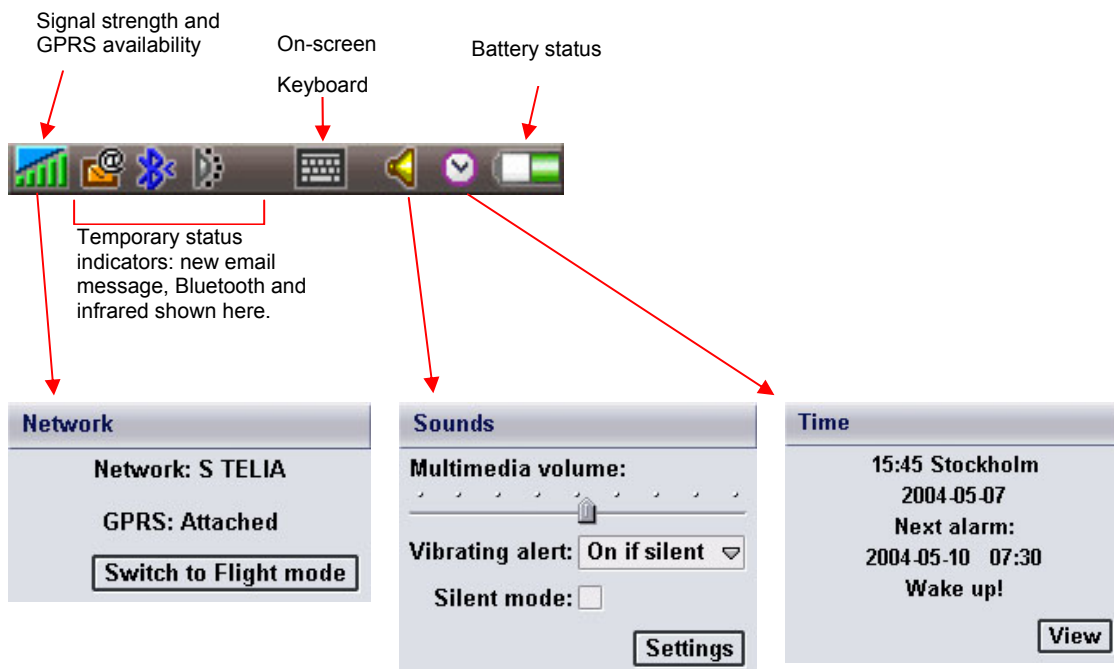
Tapping an icon in the status bar will reveal a box showing settings and information; three examples are shown above.

Features and Specification Summary

General
Size: 57 x 115 x 26 mm
Weight: 155g with battery and flip
OS: Symbian OS™ V7.0
Processor: ARM 9
User storage: Up to 64 MB
Total RAM: 32 MB

Memory Stick Duo™/PRO Duo™
Slot for Memory Stick
32 MB Memory Stick PRO Duo supplied
Memory Stick Adaptor supplied

Battery Life
Talk time: Up to 13 hours
Standby time: Up to 400 hours

GSM – Standard P910i and Chinese models
Tri-band: E-GSM 900, GSM 1800, GSM 1900

GSM – P910a
Tri-band: GSM 850, GSM 1800, GSM 1900

GPRS
Slots: 4+1
Coding scheme: CS-1, CS-2, CS-3, CS-4
Downlink rate: Up to 53.6 Kbps (CS-2)
Uplink rate: Up to 13.4 Kbps (CS-2)
(CS-2 quoted as this is the fastest scheme in use today)

HSCSD
Timeslots: 2+1 at 9.6 or 14.4 Kbps
Download rate: Up to 28.8 Kbps
Upload rate: Up to 14.4 Kbps

Screen
Type: TFT
Size, flip closed: 208 x 208 pixels, 40 x 40 mm
Size, flip open: 208 x 320 pixels, 40 x 61 mm
Pixel Size: 0.192 mm
Colour depth: 18-bit (262K colours)
Surface: Touch-sensitive
Illumination: Back-light

Input – Standard P910i and P910a
Flip Closed: Keypad switches; numeric/text characters using multitap or T9™ predictive text
Flip Open: Flip Keyboard
                 Natural handwriting recognition
                 On-screen virtual keyboard
Support for TTY devices via the accessory connector

Input – Chinese models
Flip Closed: Keypad; Numeric, Stroke, Pinyin, Bopomofo (T9™ predictive text input)
Flip Open: Chinese character recognition
                 English character recognition
                 Stroke, Pinyin, Bopomofo
Support for TTY devices via the accessory connector

Third Party Application Support
SDKs: C++
                 PersonalJava™
                 J2ME™ CLDC/MIDP 2.0 with JSR-120 and JSR-82
                 Microsoft Visual Basic v6

Phone
Office Handsfree (loudspeaker) function
Voice dial, voice answer, magic word activation
Picture Phone Book – picture of contact displayed
Ringtones: iMelody, WAV, AU, AMR, MIDI, RMF, MP3
Flight mode – use P910i as PDA with phone off
SIM-AT
USSD
ALS
CSP
Corporate Telephony

Personal Organizer
Contacts (Address Book)
Calendar (Diary)
Tasks ('To-Do' list)
Jotter (Text and colour 'ink' sketches)
Sound recorder (Dictaphone)
Time (World Clock)
Calculator
Chinese models: English-Chinese-English Dictionary
Chinese models: Lunar Calendar

Integrated CommuniCorder
Image size: 640 x 480 pixels (VGA)
                 320 x 240 pixels (QVGA)
                 160 x 120 pixels (QQVGA)
Colour depth: 24 bit (16 million colours)
Storage format
   Still images: JPEG/EXIF (without Thumbnail); 3 quality levels
   Video Clips*: 3GPP and MPEG4
                 Video: 3 quality levels
                 AMR audio: 2 quality levels
Capacity: Depends on quality level - typically 600 VGA medium quality pictures or 300 MMS quality video clips using the supplied 32 MB Memory Stick PRO Duo

* For details about different video storage formats of the CommuniCorder, see table on page 137.

Features and Specification Summary (continued)

Music player

Formats:	MP3, AAC, MP4, M4A, WAV, AU, AMR, MIDI (G-MIDI level 1 with 24 voices polyphony), RMF, iMelody
Features:	Playlists, Loop, Random, Automatic pause

Pictures (Image Viewer)

Formats:	JPEG, BMP, GIF (inc. animated), MBM, PNG, WBMP
Sharing via:	IR, Bluetooth, MMS, email, PC file transfer, Memory Stick

Video Player

File Format:	3GP, MP4
Streaming:	RTSP according to 3GPP

Messages

SMS, EMS, MMS, email (multiple accounts, PC sync)

Document Viewers

On-board:	Microsoft® Word
	Microsoft® Excel
	Adobe® Acrobat® (PDF)
On CD:	Microsoft® PowerPoint®

Integrated Browser

WAP Version:	2.0
Markup HTML	3.2 (excl. JavaScript and partial support for Frames)
Languages:	WML 1.3
	WBXML
	XHTML Basic
	XHTML Mobile Profile
	cHTML
Scripting:	Compiled WML scripts
Style sheets:	WCSS
Security:	WTLS Class 1, 2, 3
	TLS/SSL
Certificates:	Pre-install and download
	WTLS, X.509
WIM:	WIM interface including SIM-WIM

Alternate Line Service (ALS)

Customer Service Profiles (CSP)

Corporate Telephony

M-Services

Compliant with M-Services specification, phase 1

User Personalization

Themes
Background
Screen Saver
Ringtones
Alarm tones

Bluetooth

Specification:	Version 1.1
	Multilink and Sniff mode
Coverage area:	Up to 10 metres (33 feet)
Profiles:	Generic Access Profile
	Serial Port Profile
	Generic Object Exchange Profile
	Dialup Networking Profile
	Object Push Profile
	Handsfree Profile
	Headset Profile
	File Transfer Profile

Infrared Port

Maximum speed: 115.2 Kbps

Remote Synchronisation

Synchronisation with SyncML compliant servers:

Data:	Contacts, Calendar, Tasks
Bearer:	HTTP
Protocol:	SyncML

Local Synchronisation

Data:	Contacts, Calendar, Tasks, Jotter text notes, email
PC Applications:	Lotus Organizer® 5 and 6
	Lotus Notes® 4.6, 5.0, 6.0, 6.5
	Microsoft Outlook® 98, 2000, 2002, 2003
Bearer:	BluetoothTM, IrDA, USB
Protocol:	SyncML

PC Connectivity Solutions

Use the P910i as a wireless modem
2-way file transfer
Backup and Restore user data and settings
Software Installation Utility
Language Change Utility

PC Utilities

GPRS Wizard

Security

Device lock
Password generators from RSA Security and Secure Computing
Secure Software installation with X-509 certificates supporting Symbian signing program

Remote Configuration (OTA)

Ericsson/Nokia OTA Settings Specification
WAP Forum specification
Smart Messaging

Games

Chess (including multi-player over SMS)
Solitaire

Accessories

Accessory	Product name
Batteries	
Standard Battery	BST-15
Memory Stick Duo and PRO Duo. Up to 1 GB capacity supported.	
Chargers/Desk Stand	
Micro Travel Charger	CMT-10
Standard Charger	CST-13
Cig. Lighter Adapter	CLA-11
Desk Stand	CDS-11
Desk Synchronization Stand	DSS-25
Desk Speaker Stand	CSS-20
Desk Speaker Stand	CSS-25
Car	
Advanced Car Handsfree	HCA-200
Gooseneck Microphone	HCE-14
Advanced Music Mute	HCH-16
Antenna Cable	HCE-12
System Cable	HCC-20
System Cable –Generic Phone Holder	HCC-30
Bluetooth Car Handsfree	HCB-30
Bluetooth Car Handsfree	HCB-300
Car Holder - Generic	HCH-30
Dedicated Car Holder	HCH-37
Handsfree	
Portable Handsfree	HPB-20
Portable Handsfree –Bulk Only	HPE-14
Sport PHF	HPS-20
Bluetooth Headset	HBH-30
Bluetooth Headset	HBH-35
Bluetooth Headset	HBH-60
Bluetooth Headset	HBH-65
Bluetooth Headset	HBH-200
Bluetooth Headset	HBH-300
Bluetooth Headset	HBH-600
Bluetooth Headset	HBH-660

Entertainment	
Bluetooth Media Viewer	MMV-100
Bluetooth Music Handsfree	HBM-30
Bluetooth R/C Car	CAR-100 (requires a small controller application available for free at www.SonyEricsson.com).
Connectivity	
USB Cable	DCU-11
RS 232 Cable (GSM/TDMA)	DRS-11
Imageware	
Blue Torch	IBT-20
Laser Pointer w On/Off	ILP-20
Stylus Pack	ISP-20
Executive Case	IEC-20

HCB-30

HBH-30

CMT-10

DCU-11

Memory Stick PRO Duo

HBH-200

HPS-20

ISP-20

HCB-300

HCH-37

HBM-30

IEC-20

CSS-20

CLA-11

CAR-100

Product comparison: P900 to P910i

Summary Table of New Features

P910 series	P900 series
Improved Screen 262,144 (18 bit) colours in full screen picture viewing. Increased luminance together with improved user settings.	65,536 (16 bit) colours.
Flip Keyboard A 33 key keyboard making text input easier in Flip Open applications	
Document editors Document editors for Word and Excel. New PDF viewer. PowerPoint file viewer included on CD.	Document viewers only. No editing support.
Internal Memory: 96 MB total – up to 64 MB of user memory.	48 MB total – up to 16 MB of user memory.
Memory Stick file support Memory Stick Duo™, up to 128 MB Memory Stick PRO Duo™, up to 1 GB	Memory Stick Duo, up to 128 MB
Bluetooth Handsfree profile	
Java – JSR-185 (JTWI 1.0) compliance, MIDP 2.0 – API support added for Full Screen Canvas, Vibrator and Backlight. – Retrieval of IMEI and SW Version. – Protection domains for Operator, Manufacturer and Trusted Third Party applications, in line with the MIDP 2 Recommended Security Policy.	CLDC 1.0 HI, MIDP 2.0 + JSR 120 + JSR 82 (excluding OBEX/Push)
Email improvements – Prepared for Push email – HTML messages in plain text – Improved IMAP4 handling with support for read/unread status – Subscription to remote folders – The user can create local folders – To conserve memory, the user can set the maximum number of messages that can be stored in the inbox.	
PC Synch Improved support – Lotus Notes 6.0/6.5 and Outlook 2003	
Communicorder General quality improvements	
Advanced Telephony User interface improved to make call handling more intuitive.	
Corporate Telephony Improved compatibility	
Browser improvements – One Hand Navigation – Narrow-screen	
Storage Wizard A quick and easy method to free up storage space used by applications, media or other files and messages**.**	Manual clean-up using the Storage manager
Audio formats Music player now supports AAC (Advanced Audio Codec) encoded audio as .aac, .mp4 and .m4a files.	
Physical size 57x115x26 mm. Weight 155g	57 x 115 x 24 mm. Weight: 150 g.

P910i New Features in Detail

Improved screen

The P910i screen has an improved colour depth: 262,144 colours compared to 65,536 colours in the P900. Light intensity levels for active and standby screen are user adjustable.

Flip Keyboard

Located on the inside of the flip, the P910i has a new keyboard similar in design to that of a standard computer keyboard enhancing text input in all Flip Open Applications. There are versions of keyboard layout to cover the following languages.

Qwerty	Qwertz	Azerty	Others
English	German	France	Russian
American English (P910i and P910a)	Hungarian		
Swedish			
Danish			
Norwegian			
Finnish			
Dutch			
Italian			
Spanish			
Polish			
Greek			
Portuguese			
Latin American Spanish (P910i and P910a)			
Canadian French (P910a)			
Hong Kong			
Singapore			
Taiwan			
People's Republic of China (P910c)			

Extension of available characters

When pressing a key, if there are additional characters associated with that key, then these will be shown in a pre-edit box in the title area. For example, when pressing the E key, the following characters will be shown: *'e ee é è ę ĕ ë ê'*

Using the Shift key

The Shift key is used to capitalise or 'caps-lock' characters on the keyboard.

- Press the Shift key **once** followed by, for example, the E key to write a capital E. Any additional keys pressed will be displayed in lowercase.
- Press the Shift key **twice** for caps-lock. Any additional keys pressed will be displayed in uppercase until the Shift key is pressed again to remove caps-lock.

When typing, press the keys one after another. Not, for example, Shift and 'E' simultaneously.

Using the Symbols key

The Symbols key is used to access the coloured characters and numbers printed in the keyboard keys, as well as a symbol selector table. It works in a similar fashion to the Shift key, that is, pressing it once will effect only the key pressed immediately afterwards, while pressing it twice will lock the keys in symbol mode. Press once more to return to writing normal letters and characters. Pressing and holding the Symbols key brings up a table from which symbols can be selected using the Jog Dial.

Physical size

The new 57 x 115 x 26 mm size is slightly thicker than the P900, to incorporate the flip keyboard.

Internal memory

The total flash memory has been increased from 48 MB ram up to 96 MB ram and this has increased the available user memory, which is now up to 64 MB.

Memory Stick PRO Duo™

A 32 MB Memory Stick PRO Duo is supplied with the P910i but the P910i now has enhanced Memory Stick support with up to 1 GB.

Bluetooth Handsfree profile

The P910i offers a car handsfree profile. Using the Bluetooth Car handsfree HCB-300 accessory you can keep your phone in your pocket and your hands on the wheel. The HCB-300 offers two key call handling and voice dialling. The P910i also supports sniff mode and multilink.

Java

JSR-185 (JTWI 1.0) compliance, MIDP 2.0.

API support added for Full Screen, Vibrator and Backlight. Retrieval of IMEI and SW Version.

Protection domains for Operator, Manufacturer and Trusted Third Party applications, in line with the MIDP 2 Recommended Security Policy.

Email Improvements

Improved IMAP4 handling

Improved IMAP4 handling gives support for read/unread status.

Remote folders

For IMAP4 type accounts you can subscribe to remote folders that are located on the server.

Local folders

To improve the organization of messages, folders can be created locally on the smartphone. Folders created this way are only visible in the Messages application. Message folders cannot be created on the Memory Stick.

Local delete

The local delete function will delete the body and attachments of a message on the phone, to free up memory. The header will remain and the user can download the entire message from the server again should they wish to.

HTML support

Opera browser technology is used to render HTML messages.

Inbox size

The user can set the maximum number of email headers to be stored in the local Inbox. If more headers are downloaded, the oldest headers will be deleted locally.

Support for push email

Push email clients can be integrated into the Messages application and make use of existing notification icons in the status bar.

Advanced Telephony

Call handling has been improved through several changes to the phone application behaviour and user interface:

- At an incoming call the phone will switch to the phone application (regardless of previous application).
- At an incoming call, a common view will offer the most relevant alternatives, for example, Call filter, Call forwarding and Silent mode.
- Quick access to call filter in flip closed mode.
- The icons in the Incoming call dialog (for example Answer) have been made larger.
- Initiating a second call (from within a call) has been made easier.
- Setting up a conference call has been made easier.
- Sending DTMF tones (from within a call) has been made easier.

Music Player

The Music player can play AAC format audio encoded into .AAC, .M4A, .MP4 files. AAC format can, however, not be used as ring signals.

Corporate Telephony

The P910i can be integrated into a corporate telephony environment where it can exploit the existing corporate features and resources and make them easier to use. It adapts to environments like Centrex, Mobile Centrex and corporate switchboards (PABX) equipped with a mobile extension facility (like Ericsson's MD110 and BusinessPhone).

Browser improvements

The P910i browser offers a couple of new features.

Narrow Layout

The Internet application can now display a Web page in two different ways:

- As you are used to see it on your computer. This makes it easier for you to recognise the page and find the way to your favourite spots.

- Reformatted to fit the width of the screen (Narrow layout). This means you don't have to scroll pages horizontally. In the Browser application Tap **Edit > Narrow layout** to turn Narrow layout on and off.

One Hand Navigation

Web pages can also be browsed using only the Jog Dial. Select Narrow layout mode to avoid horizontal scrolling.

Hotspot navigation

Hotspots are links, radio buttons, check boxes, input fields, select lists and buttons on a Web page.

Rotate the Jog Dial slowly to select and scroll between hotspots. By pressing the Jog Dial inwards you can then:

- Open a link or list.
- Select a radio button.
- Select or clear a check box.
- Select an item in a list.
- Press a button.

You can press the Jog Dial forwards to bring up a menu with useful commands. Use the Back command to go to the previous Web page.

Storage Wizard

The Storage Wizard enables the user to quickly free-up storage space used by applications, media or other files and messages. It is easily accessible by clicking the Storage Wizard icon in the Application picker. The wizard will guide the user through the process in three easy steps.

Key Technologies and Functions in Detail

Data Storage Locations

The P910i is divided into two parts:

- A GSM phone part, having flash memory. This is very similar to a conventional mobile phone.
- An 'Organizer' part running Symbian OS and having a large amount of flash and RAM memory plus a Memory Stick slot and the ability to exchange files with a PC.

   Note: The 'Phone' application, which provides the phone MMI, exists on the Symbian OS part of the P910i; the GSM stack resides in the GSM phone part.

Important: The rest of this chapter describes the Standard P910i and P910a. Chinese models have a slightly different memory organization. This is described in chapter 'Chinese Models in detail' on page 110.

The diagram below shows the internal memory organization of a Standard P910i:
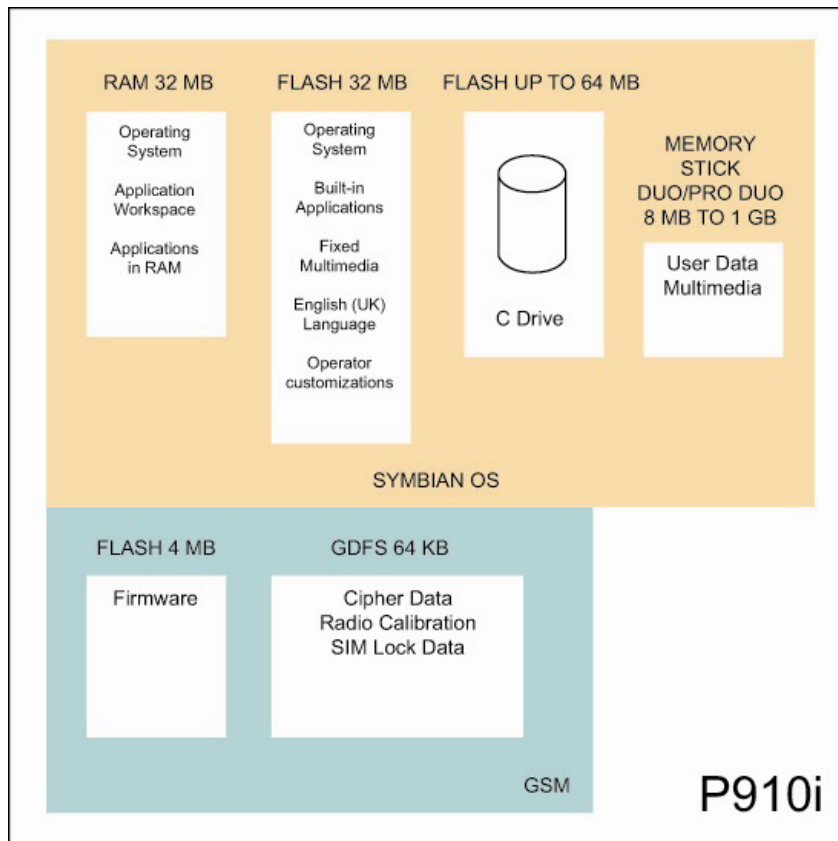
The RAM (Random Access Memory) is controlled by the Symbian OS operating system and is not used to store any user or program data. All use is dynamic and managed by the OS. The RAM is totally re-initialised when the P910i is started.

The available 96 MB flash memory is split into 32 MB for operating purposes and up to 64 MB for storage of user data, for example, audio files, pictures, documents, additional languages and settings such as the active theme. Flash memory retains data even with no power applied. Unlike some PDA devices, the P910i does not require a small 'memory backup' battery. Data stored on the P910i is therefore not subject to loss due to such a battery running down. User data may be backed up to a PC using the Sony Ericsson SyncStation DSS-25.

The first 32 MB bank is used like a ROM. It stores the Symbian (UIQ) operating system, the built-in applications and some essential multimedia information like a default ring tone. It also stores the language files for UK English which is the default language of the Standard P910i. Chinese models also have Chinese stored on the ROM.

Note: The extensive MMI of the P910i means that it is impractical to hold many languages inside the phone, as is the case for some other models.

Part of the flash memory provides a 'C:' drive of up to 64 MB capacity. This behaves just like a normal disk drive. The folders can even be viewed and managed from the File manager application or from a connected PC.

User Storage

The user storage space (C: drive) is shared across applications without any imposed restrictions, apart from the whole space becoming full.

Unlike a PC, the user does not need to be aware of the underlying filing system. Applications will always store information automatically in the appropriate folder, simplifying the management of data. Third party applications may implement more complex file management solutions where required.

Additional storage space is available by using Memory Stick. A 32 MB Memory Stick Duo is included with the P910i and Memory Sticks of up to 1 GB capacity are supported. Any number of Memory Sticks may be used for storage; for example, to store an MP3 music collection. Memory Sticks may be used to exchange data with other devices. See Memory Stick on page 26 for more information.

Depending on the application, data can be beamed, mailed, uploaded to the web, transferred to a PC or moved to a Memory Stick in order to archive and create free user space on the P910i. See Synchronisation and Data Transfer on page 93.

User storage configuration in a new P910i

Applications and information are placed in the internal storage of the P910i in the factory. This provides sample demonstration, educational, multimedia and fun content so that the P910i can be used directly out of the box. Much of this can be deleted by the user in order to make the space available for personal use.

This section describes the case for a standard, generic (non-customized) P910i.

Example showing Storage content for a new P910i

- ☐ Empty and available for user data
- ☐ Populated with data files in the factory; user can delete these files
- ☐ Additional language besides UK English, if used
- ☐ Area used for file system and settings
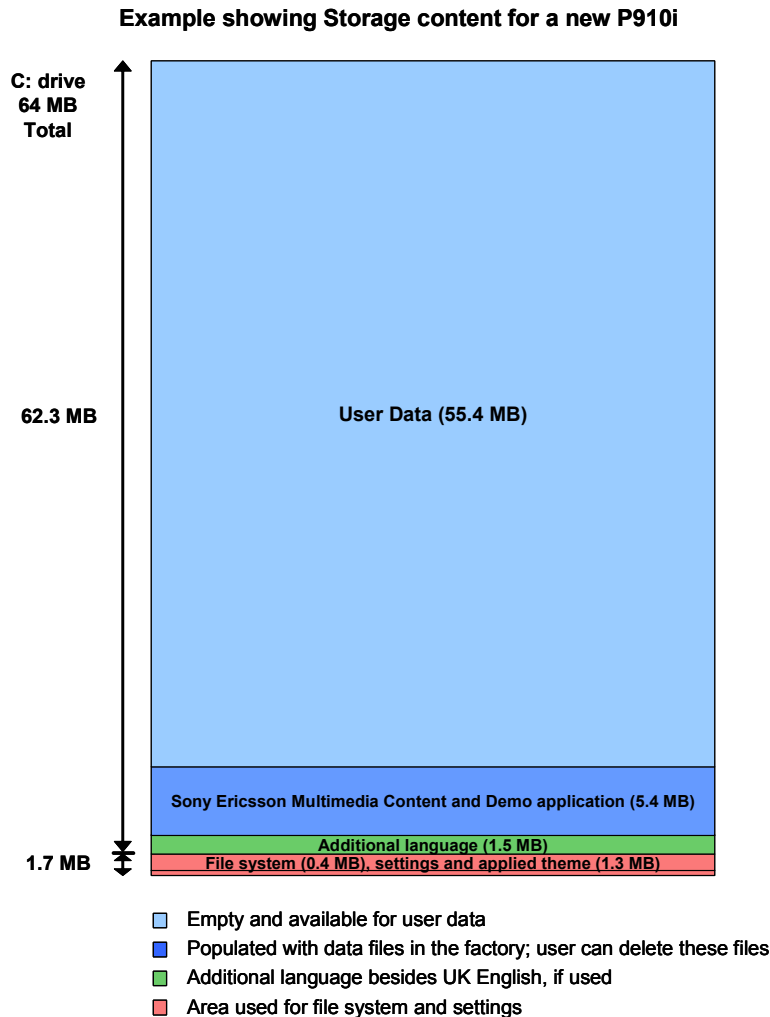
User Data

This space is initially empty. Normal uses are:

- User-data associated with built-in applications (for example, Messages, Contacts)
- Applications installed by the user
- Multimedia content added by the user

Sony Ericsson Multimedia Content

Sound, pictures, video, Demo application and other files chosen to convey the capabilities of the P910i. This is described in more detail in Personalization and Customization on page 85.

Language Files

The generic P910i is prepared for different markets. A 'Load Module' is constructed containing the languages for a given market. Therefore, a number of load modules are specified for the P910i to cover all required markets.

When the P910i is first started, the user is prompted to select a language as part of the initialisation procedure. The P910i is then restarted. The selected language file is retained on the C: drive and the other language files are deleted. UK English is stored on the ROM, as is Chinese on Chinese models.

Action at Master Reset

Master Reset will delete everything on the C: drive except for languages and (if selected by the user) user-installed applications. Data can be restored as follows:

If the user has previously backed up the P910i using the Sony Ericsson PC Suite, then the C: drive can be restored to the condition it was in when the backup was made. The exception is DRM Forward lock protected files which cannot be transferred to other media and therefore not backed up.

Otherwise, data can be re-loaded from the following locations:

- Content and Application CD
- Sony Ericsson web site

Since Multimedia content is easily transferable using Memory Stick, infrared or Bluetooth wireless technology beaming, it is simple to restore favourite content from someone else's P910i (unless DRM protected).

Folder View of Internal Storage

This section explains in more detail how the data is organized on the C: drive.

Note: The actual file and folder structure on the P910i is not exactly as shown in this document.

When viewed from a PC using Sony Ericsson PC Suite, the 'C:' drive is named 'Phone Memory', but only a subset of the folders is accessible from the PC.

There is a folder for each media type: audio, video and image. Documents (such as Microsoft Word files) are stored under the 'document' folder**.** An 'other' folder provides a place for files that do not fit into the other categories.

Beneath each media type and documents, the material on the P910i is broken into folders. For each named folder in the related P910i application, a folder is created beneath the applicable media type. For example, if the user creates a 'My MP3' folder in the Music player application, a 'My MP3' subfolder is created beneath the audio folder. **Unfiled** folders are created in the initial folder structure and all material is placed in the **unfiled** folder by default. Sony Ericsson Multimedia Content is stored in 'Sony Ericsson' subfolders. A typical folder structure is shown below as seen on a connected PC.

| File | Edit | View | Favorites | Tools | Help |

Back | Search | Folders | Address | Links

| Folders | X |

- My P910i
  - My P910
    - Phone Memory
      - audio
        - MyMP3
        - QuickTimer
        - Sony Ericsson
        - unfiled
      - document
        - Journals
        - Meetings
        - Unfiled
      - image
        - scap
        - Sony Ericsson
        - Summer pics
        - unfiled
      - other
      - video
        - Funny clips
        - Sony Ericsson
        - unfiled
    - Memory Stick
      - audio
      - document
      - image
      - other
      - video

Name	Size
Cartoon Crash	16,1 KB
Formel 66	28,2 KB
fullwide	69,7 KB
Happy Bugle	41,7 KB
Hey your phone is ringing	145 KB
jungle	65,8 KB
Serif	10,8 KB
Shimmer	13,2 KB

P910i C: drive folder structure (simplified)

Memory Stick

Memory Stick provides a convenient way of adding storage and other functions to a wide range of devices. The P910i supports Memory Stick Duo™ and Memory Stick PRO Duo™. A 32 MB Memory Stick PRO Duo is supplied with the P910i and sizes of up to 1 GB are supported.

A Memory Stick Duo can be plugged into any standard size Memory Stick slot using a Memory Stick Duo Adaptor. The two types have full electrical and file system compatibility.

Physical and Electrical Properties

Memory Stick Duo is very space-efficient. It is 20 mm wide, 1.6 mm high and 31 mm deep, giving a volume of 992 mm^3. Memory Stick Duo weighs 2 grams.

The electrical contact consists of 10 pins in a configuration that prevents them from being touched and provides high contact reliability.

Memory Stick Versions and Compatibility

There are several versions of the Memory Stick Duo available:

Memory Stick Duo (Standard)

Available Sizes: 8 - 128 MB

Hardware interface: Serial

Write protect switch: No

Colour: Violet

File system: FAT16

MagicGate™ Memory Stick Duo

Available Sizes: 8 - 128 MB.

Hardware interface: Serial

Write protect switch: No

Colour: White

File system: FAT16

Memory Stick Duo (MagicGate/High-speed data transfer compatible)

Available Sizes: 32, 64, 128 MB.

Hardware interface: Serial, parallel

Write protection: No

Colour: Dark blue

File system: FAT 16

Memory Stick PRO Duo

Available Sizes: 256, 512 MB (Magic Gate). The P910i supports sizes up to 1 GB.

Hardware interface: Serial, parallel

Write protect switch: No

File system: Fat 16/Fat 32. The P910i only supports FAT16.

The file system FAT16 can support sizes up to 2 GB; FAT32 will support sizes up to 2 TB. The P910i can currently only use FAT16.

The parallel hardware interface gives more than double the read/write speed compared to the serial interface. The P910i uses only the serial interface.

Memory Stick Support

PC and Apple Mac Support

PCs and Apple Macs may be enabled for Memory Stick via built-in Memory Stick slots, Floppy Disk adaptors, PC Card adaptors, USB adaptors and even a Memory Stick enabled mouse. (Memory Stick Duo Adaptor required)

Industry Support

Memory Stick is supported by a wide range of companies including major names in consumer electronics, computing, automotive, mobile phone, photographic and semiconductor sectors of industry. As of June 30 2004, 555 companies have declared support at www.memorystick.org.

Memory Stick compliant products include PCs, PDAs, digital cameras, portable music players, printers, projectors and entertainment robots. Future applications include home and car audio, game machines and multimedia kiosks.

Memory Sticks are currently marketed by Sony, SanDisk, Lexar Media, I-O Data Device Inc. and Apacer Technology. As of February 2004, there were already over 60 million Memory Sticks in use worldwide. This is expected to reach 200 million in 2005. (Source: www.memorystick.com)

Memory Stick in the P910i

Any number of Memory Stick Duo units can be used with a P910i, providing virtually unlimited storage opportunities. Here are some examples of how Memory Sticks can be used with the P910i:

- Additional storage for pictures taken with the CommuniCorder
- Images from the CommuniCorder can be transferred to other image-aware devices such as PCs and printers.
- Transfer of data and media (sound, pictures, video clips, documents etc) between the P910i and a PC or Mac
- Save data and media from the P910i on to a Memory Stick, for example, to make backup copies of important files.
- Transfer of data and media between P910is.
- New applications may be installed from a Memory Stick.
- Third party applications can make use of Memory Stick storage.
- Data can be transferred over SyncStation between a Memory Stick in the P910i and a connected PC.
- Personalize the P910i using media on a Memory Stick, for example, ring signals, alarm sounds and pictures of contacts.
- Use media on a Memory Stick when composing MMS messages.

Specifically, the following built-in applications are able to work with the Memory Stick: CommuniCorder, Pictures, Video Player, Music player, Email (attachments), Viewers and Editors (for example QuickWord), MMS (media), Browser, Phone (ringtones, screensaver), Contacts (pictures of contacts; ringtones).

Compatibility with other Memory Stick devices

The P910i defines its own folder structure on a Memory Stick, within a vendor-specific area and this is the only area that can be accessed by all of the P910i applications, except for the File manager. The File manager may be used to move files between the P910i's MMFH (Multimedia File Handling) system and folders placed on the Memory Stick by other devices, thus allowing files to be shared between the P910i and other devices.

Memory Stick connected to a PC

Using the supplied Memory Stick Duo Adaptor, the P910i's Memory Stick Duo/PRO Duo may be inserted into a PC or camera that supports Memory Stick.

In the example below, the Sony Vaio PC locates the Memory Stick on the S: drive. The Memory Stick is new and has been initialised by the P910i. Note that some capacity is taken up by the filing system.
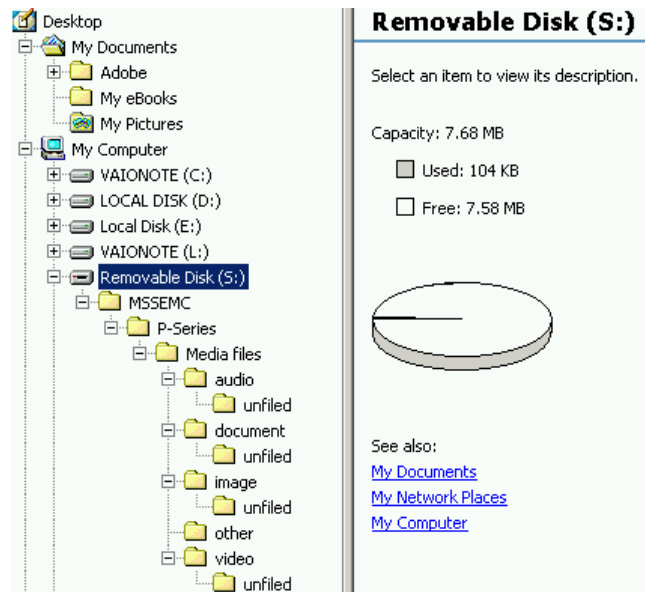
Folders **MMSEMC** and **P-Series** identify the data structure as that of the P910i, according to defined Memory Stick conventions. Media data is stored in the standard P910i structure.

File and Folder Management

File Manager Application

The File manager allows the user to explore and manage the files and folders held on both the internal flash memory and the Memory Stick Duo. A straightforward graphical interface allows exploration of the folders. The example shown on the right shows the sequence of screens as the contents of '\Audio\Pop' is explored. Two audio files are located in the selected folder.

The external memory is shown, but the same facilities are provided when external media is selected.
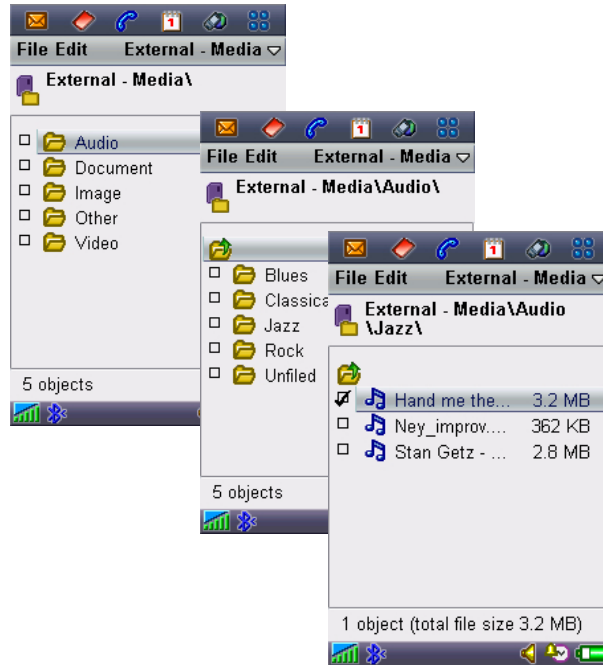
The File manager menu options
The following operations may be carried out on folders:

- Create
- Delete
- Rename
- View properties which include the total size of files contained in the folder and its subfolders.
- Change the Read only and Hidden attributes.

The following operation may be carried out on files:

- Delete
- Rename
- Move
- Copy
- View properties
- Open - if they belong to an application installed on the P910i.
- Send as – file may be sent using email, Bluetooth, infrared and so on.
- Change the Read only and Hidden attributes.

The two images on the right illustrate the File manager menu and viewing of a selected file's properties.
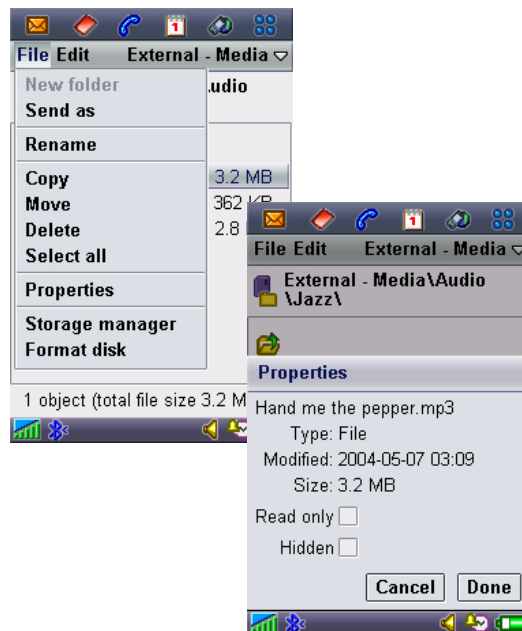
If File manager is used to browse a Memory Stick that has been used by another device, for example, a digital camera, additional folders may be visible. The illustration below shows the folders that may be present on such a Memory Stick.
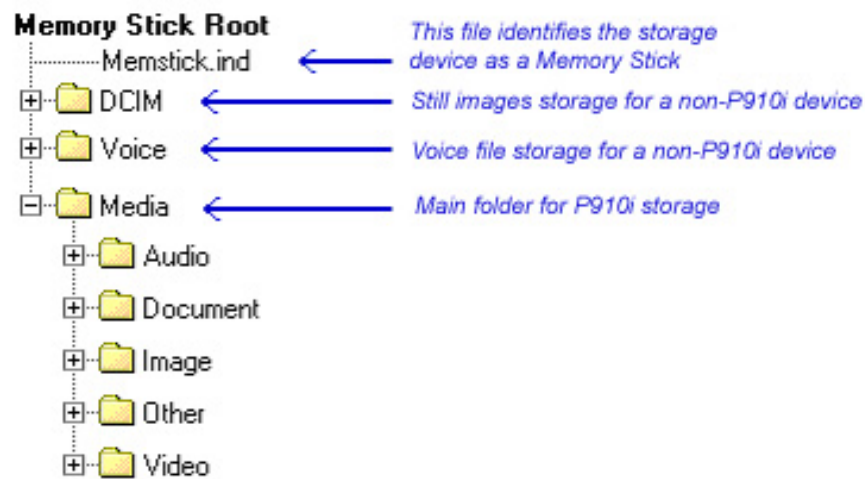
*Memory Stick file structure showing a combination of
P910i folders and folders created by other devices*

The 'DCIM' and 'Voice' folders, which have been created when the Memory Stick was used in other devices, will be visible when viewed in a P910i. If supported files in these folders are to be made available for P910i applications, they must be moved to one of the folders within P910i's 'Media' folder; this may be done using the P910i's File manager.

Storage Manager

Storage Manager provides management of application and files.

The Storage Manager provides a list of all the applications installed on the device.

Facilities are provided for:
- Running any of the applications.
- Reviewing the space taken by each category of files and space remaining on the internal memory.
- Uninstalling applications other than the standard P910i applications.

The Files button gives access to a file management screen, enabling users to perform the following actions:

- Review the space taken by individual files held in the internal or external memory, listed according to their type.
- Copy files to a different folder.
- Delete files. This can be done either
  - directly from this file management screen, or
  - by switching to the associated application and deleting from there. This allows files to be reviewed before deletion.
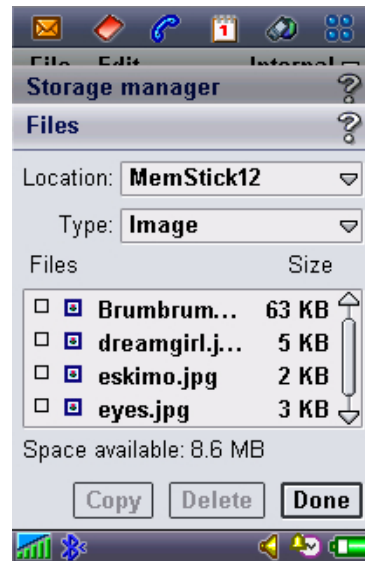
Storage Wizard

The Storage Wizard is easily accessible by clicking the Storage Wizard icon on the Application launcher. It enables you to quickly free-up storage space used by applications, media or other files and messages. Three simple steps will guide you through the following:

Step 1   Applications. You can remove applications that you no longer use such as the pre-installed Demo.

Step 2:   Files. Get a list of the image, audio and video files on the device. You can delete files you no longer need or move them to your Memory Stick.

Step 3   Messages. See how much storage is used by messages in different folders. You can delete the ones you no longer need.
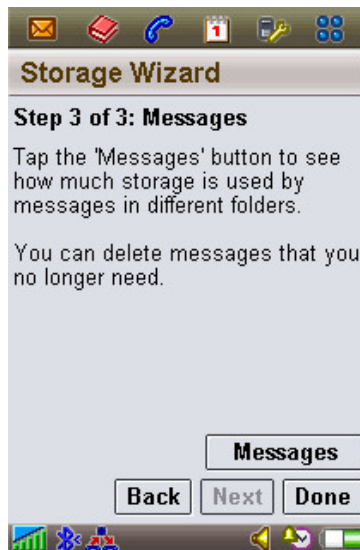
Phone and PIM Applications

Phone

The P910i is a multi featured mobile phone having full integration with the other functions of the device, including third party applications.

The phone includes a wide range of useful and fun features such as:

- **Personalized ringtones** – conventional or polyphonic ringtones can be set in Contacts, giving audible caller identification. Supported formats are AMR, AU, iMelody, MIDI, RMF (Beatnik), MP3 and WAV.
- **Picture Phone Book** – if there is a picture of the person in Contacts, it will be displayed when making outgoing calls, when receiving the CLI with an incoming call, and also on the speed dial screen.
- **Quick access back to the Contact Card** - makes it easy to try an alternative number or send an email if the contact is unavailable or busy. Used during a call, this facility allows access to numbers stored in Contacts, for example, account numbers needed for personal banking.
- **Voice dial** – make a call by speaking the contact's name. The contact's name may be recorded when entering/editing the entry in Contacts. The call is made by pressing the OK button on the flip or the button on the headset.
  If a 'magic word' is recorded, contacts may be dialled by saying the magic word followed by the contact name. It is then not necessary to press any buttons. Note that 'magic word' and recording of voice labels is not supported while using a Bluetooth cordless handsfree device.
- **Voice answer** – an incoming call may be answered, or sent a busy signal, using the words recorded for 'answer' and 'busy'. There is 40 seconds of storage space allocated for voice dial and voice answer. This is enough for approximately 35-40 words (contact names plus 'magic word', 'answer' and 'busy')
- **Access to most other applications** while talking on the phone.
- **Office handsfree** (speakerphone) is enabled when the flip is opened, making it easy to access applications such as Calendar and Jotter while talking.
- **Flight mode** - enables the P910i to be used as a PDA in situations where radio transmitters may not be used. The GSM and Bluetooth transmitters and receivers are switched off.

Brief overview of the phone user interface

In FC mode, the phone is driven by the keypad, like a conventional mobile phone.

If the flip is opened, the phone application re-scales itself to the full screen size. Other P910i flip closed applications are also able to do this.

A traditional keypad view is available.

The speed dial view provides one-touch dialling to nine contacts.

A call log view provides summary details of calls made, received and missed. Full details can be viewed from here.

The shortcut view automatically takes pictures from Contacts and places them under the shortcut button. The Jog Dial also works in this view; scroll to highlight the desired contact and press the Jog Dial inwards to call.

P910i as a Corporate Telephone

Corporations have traditionally used fixed-line and DECT phones in the office, but now there is a strong trend towards GSM. Of prime importance, however, is that users can still access the features and functionality of their corporate communication system, no matter which phone they are using. The P910i was developed to interact with corporate telephony features. It can be used with a corporate switch (PABX) equipped with a mobile extension port (for example Ericsson's MD110 or BusinessPhone), a Centrex service provided by the operator or some other server that can be controlled by DTMF tones.

Feature buttons

The user activates the corporate features through a graphical user interface by pressing feature buttons. Each button displays an easy-to-understand text description of the function. When pressed, it sends a string of DTMF tones. It can even send data that the user is prompted to provide, such as the date they will be back from a business trip. Feature buttons and text descriptions are easily configurable.

The most used in-call features can be displayed during ongoing calls. Additional call features are displayed on a list under the **More** button.
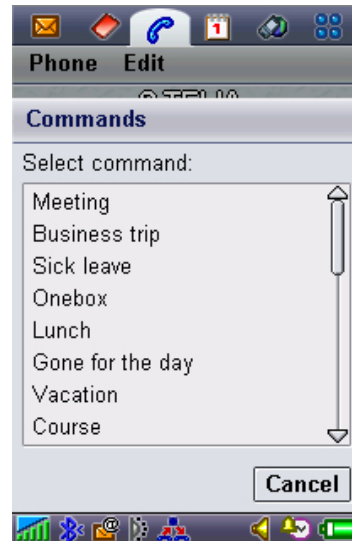
Offline commands are displayed under the 'corporate' status bar button. The offline commands will result in a call being made to the corporate switch and the DTMF string being automatically sent. The call is cleared immediately after tone sending, if this is specified.

Routing of corporate calls

In the case where the company uses a PABX, calls must be routed via this in order to gain access to corporate features and resources. Therefore, P910i can route outgoing calls to the corporate switch, instead of to the dialled B-party. To complete a call, the B-number is then sent as tones to the mobile extension port of the PABX and the call set-up is completed. This process is completely transparent to the user.

A user may dial either an internal number, for example, 1234, or a public number, like +468 123 4567. The internal number will be sent as is to the mobile extension port of the corporate switch. A public number will be expanded with the external line prefix before being sent. In case GSM calls are expensive to the

company, it may not be economically viable to first make one call to the switch and then one more to the B-party over GSM. In such cases, the P910i can be set to bypass the switch for external calls. It is still possible to route international calls through the corporate network.

Configuring the phone for the company

The person responsible for the corporate communication services defines how the phone shall be configured. This may be the company's IT manager, the operator or a service provider. They define what feature buttons shall be displayed in the phone, which tones they generate and what text they display. They also define how the P910i should handle calls to and from the corporate switch. This is all done in an XML-structured configuration file, with the extension .pbx. The configuration file is downloaded to the phone, and the particular mobile phone number is added to the list of mobile extensions in the PBX. The Corporate Telephony functionality can then be activated on the phone using the calling cards function.

For more information please go to www.SonyEricsson.com/professionalsolutions and look for "Areas of use".

Contacts

The P910i's Contacts application holds the details of all the user's contacts. It is available in FC and FO modes and is fully integrated with the phone and other PIM applications. Each contact can contain multiple phone numbers and email addresses, name and address details, personal notes and a picture or photograph. Most of this information will typically be transferred to the P910i when it is synchronised with a PC application such as Outlook or Notes. Contact data can also be added and edited on the P910i itself. Local and remote synchronisation is possible using the SyncML standard; see *Synchronisation and Data Transfer* on page 93 for more information.

Contact data can be beamed in or out using Infrared and Bluetooth. It can also be sent and received using Messages. See the Object Exchange section for full details.
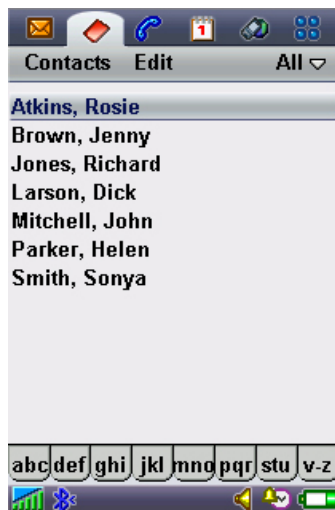
Contacts are displayed in a list, which may be filtered by folder such as business or personal.
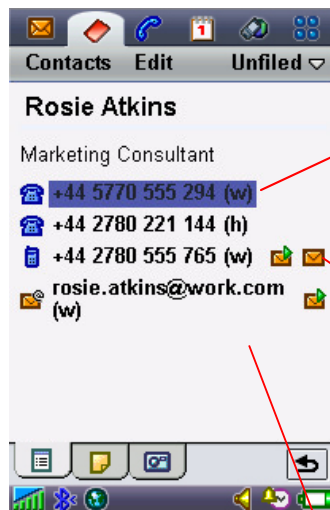
Selecting a person in the list shows their details. One tap will initiate a phone call, a new message or URL in the browser.
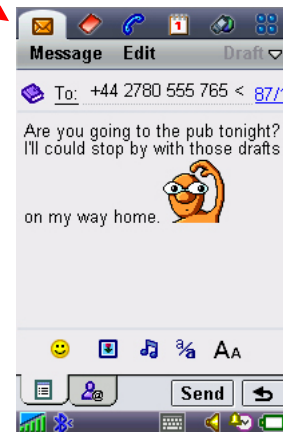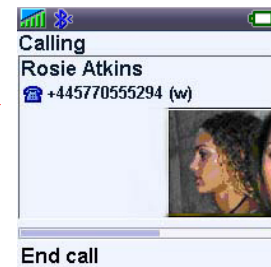
Photograph of Rosie stored in Contacts. Picture formats supported: BMP, GIF, JPG, MBM, PNG, WBMP.

A voice dial tag can be recorded, enabling Rosie to be called by saying her name.

A personal ringtone sound can also be set. It will be played whenever Rosie calls and her CLI (Caller Line Identification) is passed to the P910i. Audio formats for ringtones are MP3, AMR, AU, iMelody, MIDI, RMF, WAV.
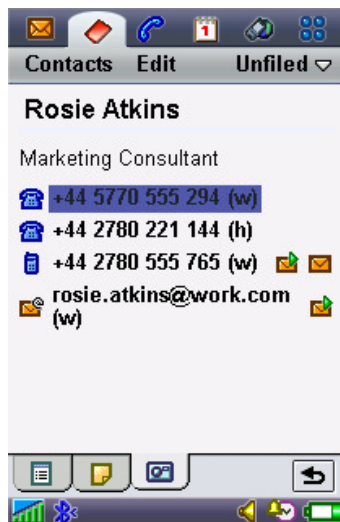
Calendar

The Calendar application keeps track of appointments and events and enables reminder alarms to be set. The alarm sound can be personalized, using any of the supported sound formats. Appointments can be shared using Infrared, Bluetooth beaming, and also by Messages. Local and remote synchronisations are both supported using SyncML; see *Synchronisation and Data Transfer* on page 93 for more information. The Chinese models support the lunar calendar.
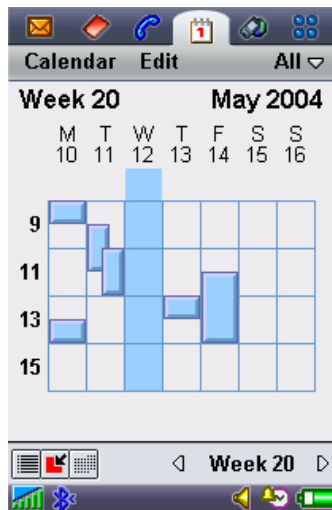
Week and month views provide a high level view of free and occupied time.

Convenient daily summary view.
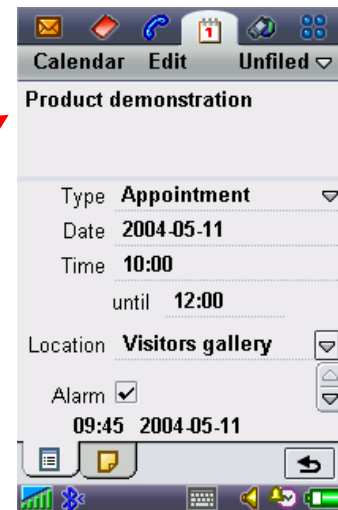
One tap shows the details of an appointment.

Tasks

Tasks is a simple yet powerful application, which manages a list of tasks to be done. Task items may be beamed, exchanged using Messages, synchronised locally, and remotely using SyncML, see *Synchronisation and Data Transfer* on page 93 for more information.
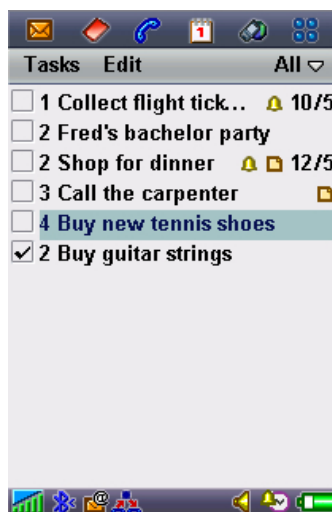
List of current tasks
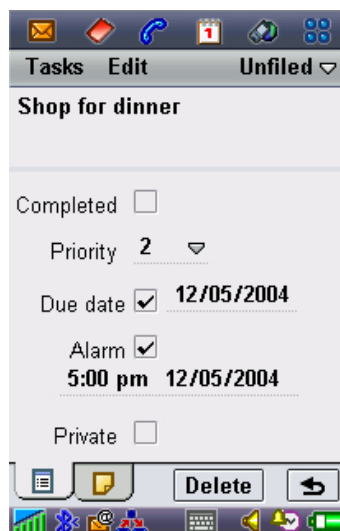
Detail view of a task

Notes attached to a task.

Jotter

The Jotter application provides a quick means of making notes in either text or sketch format.

Notes are displayed in a list format for fast reference. The pencil indicates a sketch.
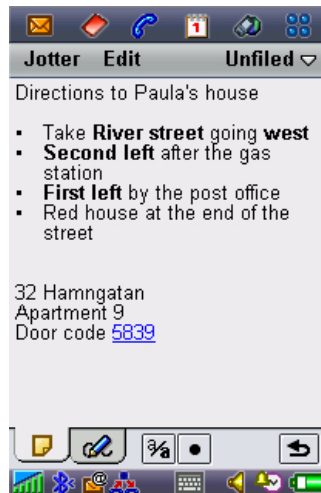
Text notes can be made using handwriting recognition or the virtual keyboard.

Diagrams and sketches can be made in colour, using the stylus like a pen.

Time, Sound recorder and Calculator
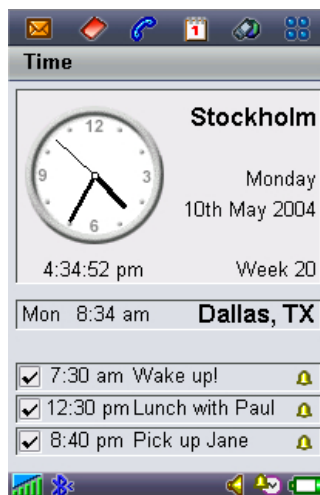
Time is a sophisticated alarm clock, which can show the time both locally and in another time zone. Alarms can be set. The alarm signal can be personalized using sound clips.

Sound recorder is a simple screen-driven dictation machine with the added advantage that recordings can be beamed and exchanged via Messages. It can also be used to record a personal ringtone.
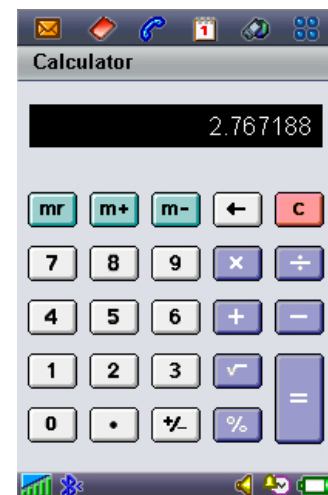
Calculator has the features of a standard desk calculator, and is always available from the application launcher.

Multimedia

The P910i has extensive multimedia capability in many applications. This section explains the different standards supported and provides a summary of capability by application.

Audio Formats

The table below explains the various audio formats supported by the P910i, together with indicative file sizes for 60 seconds of playback.

Format	Example File Size	Description
AAC	**800 KB (128 Kbps)**	Advanced Audio Coding. This is one of the audio compression formats defined within the MPEG-2 and MPEG-4 standards. Compared to MP3 it has more advanced features and is more efficient. AAC is commonly used as an audio component of an MPEG-4 video file or stream. The P910i Video Player can play AAC format audio, which is encoded into an MPEG-4 file or stream.
AMR	**94 KB (12.2 Kbps)**	Adaptive Multi Rate. AMR is a speech compression format that is highly optimized for the mobile environment, requiring as little as 4.75 Kbps bandwidth. AMR is used to convey voice recordings in MMS, 3GPP video clips or streams. P910i records AMR using 12.2 Kbps with a sample rate of 8kHz.
AU	**5.2 MB (22 kHz)**	Similar to WAV, this is an audio format commonly used in the Macintosh, Unix and Java worlds. It is not commonly used for content on mobile devices.
iMelody	**6 KB**	A format commonly used for monophonic ringtones.
MIDI	**20 KB**	Musical Instrument Digital Interface. MIDI specifies a format, which describes music in a binary format, which may then be stored as a file. Unlike the other formats, MIDI is not a recording of music but a description, which enables a local synthesizer to play the music from the instructions included in the MIDI file. MIDI is ideal for polyphonic ringtones. The P910i includes the Beatnik mini-BAE^{TM} (Beatnik Audio Engine) providing support for General MIDI Level 1.
MP3	**960 KB (128 Kbps)**	MPEG1 Layer 3 audio compression. MP3 is a very popular format for portable players and downloading songs from the internet due to its smaller file size. The compression achieved with MP3 files is a question of size/quality compromises; a factor of 12 compression is typical.
RMF	**72 KB**	Rich Music Format^{TM}. A file format developed by Beatnik combining the compact size of MIDI files with the high quality of sampled sound.
WAV	**5.2 MB (22.05 kHz)**	This is typically used for short 'alert' sounds. The size of files is determined by sample rate, bits-per-sample and mono/stereo.

Loudspeaker Characteristics

General

The P910i's built-in loudspeaker is most sensitive to middle and high frequencies; tones below 400 Hz generate distortion instead of bass. Therefore, sampling frequency for WAV should not be reduced below 16 kHz or the characteristic low frequency sampling 'ringing' will be very distinct compared to that of a more linear system.

Recommended WAV file format for the loudspeaker is 22.050 kHz sampling rate, 8-bit samples and 1-channel (mono).

P910i Loudspeaker

Ringtones

The frequency should be kept around 4 kHz with a narrow bandwidth in order to generate high SPL (~90dBSPL@40cm) ring tones.

Stereo Headphone Characteristics

The P910i is supplied with a pair of high quality stereo headphones.

Recommended WAV file format for playback over the headphones is 44.1 kHz sampling rate, 16-bit samples and 2 channel (stereo). Files using this standard are very large – use WAV only for short bursts of sound.

Recommended MP3 settings are 64 Kbps stereo.

Image formats

The table below explains the various image formats supported by the P910i, together with indicative file sizes for a QVGA (320 x 240 pixel) image.

Format	Example File Size	Description
BMP	226 KB	Microsoft Windows Bitmap. A graphics format defined by Microsoft supporting 1, 4, 8 or 24 bit colour depth. No compression, so files can be very large. Used for icons and very small images.
GIF	42 KB	Graphics Interchange Format. Highly compressed by limiting the colour palette to 16 or 256 colours. GIF is therefore good for icons and diagrams. When a Jotter sketch is sent as an email attachment, the GIF format is used.
GIF (animated)	210 KB (5 frames)	A GIF animation containing a number of images in a timed and repeating sequence. Some P910i applications display only the first image in the sequence.
JPEG (.JPG)	13 KB	An image compression format managed by the Joint Photographic Experts Group. The format supports various degrees of compression, enabling different quality/file-size balances to be provided in one standard. JPG files support millions of colours and are therefore good for 'real life' photographs.
MBM		Multi Bitmap. This is a Symbian OS format for colour and greyscale bitmap images.
PNG	166 KB	Portable Network Graphics. PNG compresses images with millions of colours no loss of detail, but has comparatively large file size. It is not commonly used.
WBMP	23 KB	Wireless BitMap. Part of the WAP specifications, an image format optimized for small mobile devices. The P910i supports Black and White, 2-bit greyscale and 6-bit colour modes, according to ETSI 3GPP TS 23.040

Colour Screen

The Pictures application uses 262 thousand colours in its full screen mode. In all other cases 65 thousand colours are used. Images having more colours than used by the application will be adjusted to display optimally within the capabilities of the P910i screen.

Images larger than the display area will generally be scaled to fit the application window.

The Image and Video Viewers make use of the whole screen (320 x 208 pixels) in Wide Screen mode.

Screen Specification

Type:	TFT
Size, flip closed:	208 x 208 pixels, 40 x 40 mm
Size, flip open:	208 x 320 pixels, 40 x 61 mm
Pixel Size:	0.192 mm
Pixel Density:	132 DPI (Dots Per Inch)
Colour depth:	18-bit (262,144 colours)
Surface:	Touch-sensitive
Illumination:	Back-light

Media Format and Application Summary

This table summarises the P910i applications and shows which audio, image and video formats are supported by each. It also shows the storage locations that can be accessed in each case. A description of the MPEG-4 and 3GPP video formats is provided in the Video Player section of this document.

Application	Usage Case	Audio Formats								Notes
		AAC	AMR	AU	iMelody	MIDI	MP3	RMF	WAV	
Phone	Ringtones		✓	✓	✓	✓	✓	✓	✓	7
Phone	Picture Phonebook									1
Phone	Speed Dial image									2
Phone	Background image									
Music player	Play	✓	✓	✓	✓	✓	✓	✓	✓	16
Video Player	Play	✓	✓							3
Contacts	Personal Ringtones		✓	✓	✓	✓	✓	✓	✓	7
Contacts	Picture of contact									4, 5
CommuniCorder	Save photos/videos									6
Pictures	View photos									
Time	Alarm		✓	✓	✓	✓	✓	✓	✓	7
Calendar	Alarm		✓	✓	✓	✓	✓	✓	✓	7
Tasks	Alarm		✓	✓	✓	✓	✓	✓	✓	7
Sound recorder	Record/play								✓	8,9
EMS	Media objects				✓					
MMS	Playback		✓	✓	✓	✓	✓	✓	✓	
MMS	Compose		✓	✓12	✓12	✓12		✓	✓12	11
Email	Display attachment	✓18	✓13	✓13	✓13	✓13	✓13	✓13	✓13	
Email	Attach and send	✓18	✓	✓	✓	✓	✓	✓	✓	
Browser	Play/Display		✓	✓	✓	✓	✓20	✓	✓	
System	Screensaver									

Summary table continued…

Application	Usage Case	Image Formats							Video Formats		Storage Access		Notes
		BMP	GIF	GIF/animated	JPG	MBM	PNG	WBMP	+3GPP/File/MP4	+3GPP/Stream	Internal	Memory Stick	
Phone	Ringtones										✓	✓	7
Phone	Picture Phonebook	✓	✓	✓17	✓	✓	✓	✓					1
Phone	Speed Dial image	✓	✓	✓17	✓	✓	✓	✓					2
Phone	Background image	✓	✓	✓	✓	✓	✓	✓			✓	✓	
Music player	Play										✓	✓	16
Video Player	Play								✓	✓	✓	✓	3
Contacts	Personal Ringtones										✓	✓	7
Contacts	Picture of contact	✓	✓	✓17	✓	✓	✓	✓			✓	✓	4, 5
CommuniCorder	Save photos/videos				✓				✓		✓	✓	6
Pictures	View photos	✓	✓	✓	✓	✓	✓	✓			✓	✓	
Time	Alarm										✓	✓	7
Calendar	Alarm										✓	✓	7
Tasks	Alarm										✓	✓	7
Sound recorder	Record/play										✓		8,9
EMS	Media objects	✓									✓		10
MMS	Playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓21	✓21	
MMS	Compose	✓12	✓	✓	✓		✓12	✓	✓12	✓12	✓	✓	11
Email	Display attachment	✓14	✓14	✓14	✓14	✓14	✓14	✓14	✓15				
Email	Attach and send	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Browser	Play/Display	✓20	✓	✓	✓	✓	✓	✓	✓	✓	✓19	✓19	
System	Screensaver	✓	✓	✓	✓	✓	✓	✓			✓	✓	

Notes for Media Format and Application Summary Table

1   The number dialled, or an incoming CLI, is matched to a contact. The picture stored against that contact is then displayed.

2   The speed dial button is linked to a contact. The current picture of that contact is displayed in thumbnail format.

3   The audio must be encoded in file or stream. An Audio-only file or stream is also supported.

4   The source may be in the formats and locations indicated.

5   A copy of the image is stored in the Contacts database.

6   The Pictures Remaining figure is calculated for the currently selected storage location.

7   Some system default sounds and options are also available. These may not be modified or deleted by the user.

8   Stored in internal storage. May be played in Sound recorder, selected as ringtones or included in MMS messages.

9   Playback of Sound recorder recordings only; all other audio playback is in the Music player.

10   Limited to Black and White, 8x8, 16x16 and 32x32 pixel.

11   All formats can be attached to an MMS.

12   These formats may not be supported on the receiving mobile phone.

13   Played via Music Player.

14   Displayed in Pictures.

15   Played via Video Player. Handled as attachment only.

16   In its standard Playlist view, the Music player lists only MP3 files. Other types of audio tracks are displayed in the Manage tracks view, and which types to display can be changed via the Edit | Preferences menu.

17   The first frame of the animated GIF is displayed as a static image.

18   When encoded in a 3GP file. Played by the Video Player. See also note 3.

19   Locally stored content can be accessed via the file:/// URL, for example, File:d:///Media%20files/document/menu/menu.htm.

20   Will automatically launch the appropriate application.

21   Subject to OMA DRM Forward Lock restrictions.

Data Flow Summary

The diagram below shows a generalised view of the ways in which data can be imported, stored and exported. Data is stored in a generic multimedia structure for images, audio, documents, and other types (including video). Therefore, an image received as an email attachment can be saved and used by any application capable of reading it.
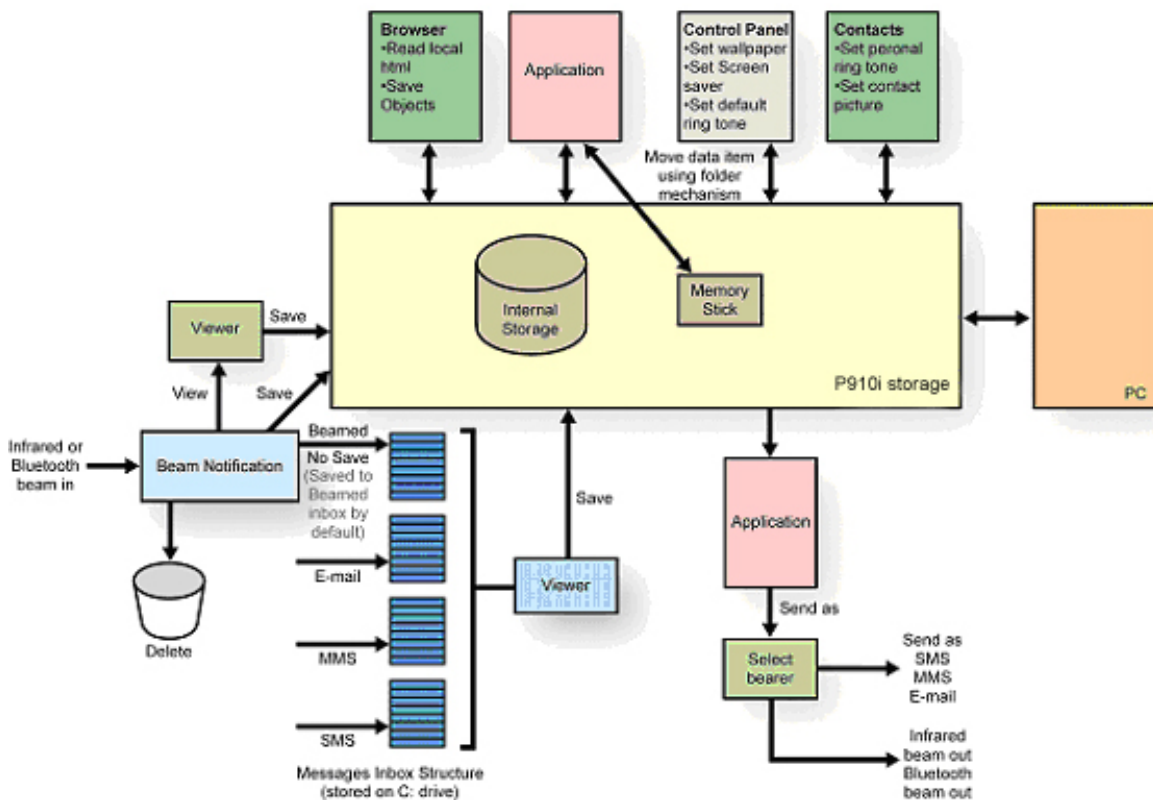
Beaming

When an infrared or Bluetooth beamed object is received, the user is immediately notified via an on-screen alert. The object can be viewed, saved or deleted. If no action is taken, the object is saved in the Beamed Inbox in Messages.

The Send as command in many applications allows an item of data to be beamed from the P910i. For more information see Object Exchange – 'Send as' on page 96.

Viewer

The 'Viewer' boxes, in the diagram above, are instances of P910i applications that show selected details of the object and provide an option to save the object.

Messages

Objects embedded in, or attached to, messages can be viewed and saved via the Viewer mechanism described above. Background and ringtones can be selected directly from MMS messages.

The Send as command in many applications allows objects to be sent with a message. It is also possible to add multimedia attachments while composing MMS and email messages.

Application Behaviour

This section highlights certain application capabilities that are useful to understand.

Browser

The Browser is able to read HTML based content from local storage. More importantly, a long tap on an object such as a picture will display a menu, from which it is possible to save the object to storage. This enables images to be collected and saved in internal or Memory Stick storage.

Folders

Almost all applications use folders to allow the user to sort information into useful groups. This mechanism can also be used to move an object between the Internal Storage and the Memory Stick. The Application summary table on page 44 shows which built-in applications have this ability. A separate application menu function, where provided, enables an object to be copied between Internal Storage and Memory Stick.

Control Panel

Background, Screen Saver, and default ringtone are set here. Refer to Personalization and Customization on page 85 for more information.

Contacts

In Contacts, the user can select a picture from the P910i storage and save a copy against a contact. A compatible audio file can be linked to a contact and played as a ringtone when that contact is identified as the calling party.

Sony Ericsson PC Suite

The Sony Ericsson PC Suite enables multimedia content to be freely copied and moved between the P910i storage and a connected PC. The Internal Storage and Memory Stick appear as separate drives when viewed from the PC. See Synchronisation and Data Transfer on page 93.

Music player

The P910i Music player is a multi-format digital audio player, which enables the user to play a selection of favourite songs.

Music player Specification

- Formats: MP3, WAV, AU, AMR, MIDI, RMF, AAC and iMelody.
- Features: Playlists, Random order, Loop, Automatic pause on incoming call.

Songs may be stored in the internal P910i user storage and on Memory Stick. Songs may be collected in numerous ways, including Internet download, file transfer from the PC using SyncStation and, of course, Memory Stick.

The Music Player is intelligently aware of other applications on the P910i:

- Playback is paused when a telephone call is made or an incoming call is accepted.
- Playback is paused if the user starts another application, which requires the audio channels to be dedicated to it.
- Playback of MP3 and AAC files continues if the user switches to another application, thus providing music while using other applications such as PIM or Messages. Playback is also unaffected when opening or closing the flip.
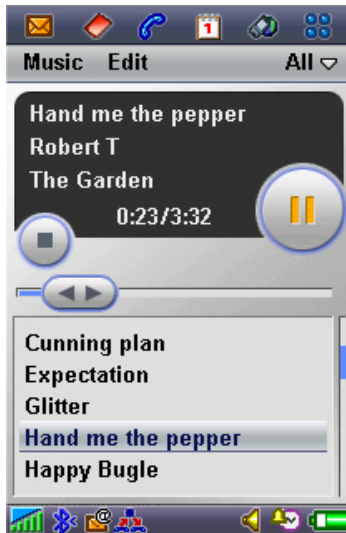
The Music player is started from the Application Launcher and is accessed in Flip Open or Flip Closed mode.

The playlist is shown in the lower half of the screen and the currently selected track is shown at the top. The playlist is made up from all the tracks found in the selected folder – the image on the left shows all the folders (internal memory and Memory Stick) have been selected.

The duration of the track is displayed in the top half of the screen together with information extracted from the file. For MP3 tracks, information is read from the ID3 tags in the file, and this includes artist, album and filename. ID3 1.x and 2.0 is supported.

Songs can be played in consecutive order or in a random sequence. A Loop function enables the playlist to be repeated automatically, providing continuous music.

Preference settings allow different file types to be included or excluded from the playlist. By default, only MP3, AAC, M4A and MP4 audio files are listed.

The Manage Tracks menu option allows tracks to be moved to different folders to make up playlists. Tracks can also be deleted.

Imaging

CommuniCorder

The P910i has a built-in camera for capturing still pictures and video recordings.

The still picture resolution can be set to:

- 640 x 480 pixel (VGA) (307,200 pixels), or
- 320 x 240 (QVGA), or
- 160 x 120 (QQVGA).

All these resolutions provide a 24 bit colour depth (16 million colours).

The video recorder has a 176 x 144 pixel (QCIF) resolution and uses real time video encoding with 3GPP H.263 or MPEG4 compression, together with Adaptive Multi-Rate (AMR) compressed sound. For details refer to the table on page 137. For a suitable PC Player please refer to www.SonyEricsson.com/p900/videoplayer.

The CommuniCorder may be used in Flip Closed mode for fast point-and-shoot pictures using the screen as the viewfinder. The lens is recessed into the back of the P910i. With the flip open, the viewfinder is supplemented with graphical controls and access to camera settings. For still images, the viewfinder is always 160 x 120 pixels, irrespective of the resolution at which the picture is taken. In video modes the viewfinder is 176 x 144 pixels. A dedicated hardware button on the side of the P910i provides fast access to the CommuniCorder application.

Images are stored in the P910i's filing system and are therefore available for other applications to use. The number of images that can be stored depends on the available file space, which is shared with other applications. In FO mode, the viewfinder will give an estimation of the number of images remaining using the current settings for size and quality. Approximate JPEG file sizes are 50 Kbytes for VGA, 18 Kbytes for QVGA and 3 Kbytes for QQVGA (for medium quality images).

Images are placed into a user-definable folder on either internal or Memory Stick storage. They may be viewed and organized in the Pictures application, and are available for use by other P910i and third party applications.

Ready/Busy Indicator

Recording time remaining

Mode selection – operated by rotating the Jog Dial

View finder

In Flip Closed mode, the CommuniCorder is optimized for rapid 'point-and-shoot' operation.

The first press on the CommuniCorder button will switch on the viewfinder. Each further press on the button will then act as the shutter control – depending on the mode, either taking still pictures, or alternately starting and stopping the video recorder

Picture size and quality indicators

Number of pictures that may be taken with current camera settings and the available memory

Shutter control

MMS button

Shortcut to the Pictures application
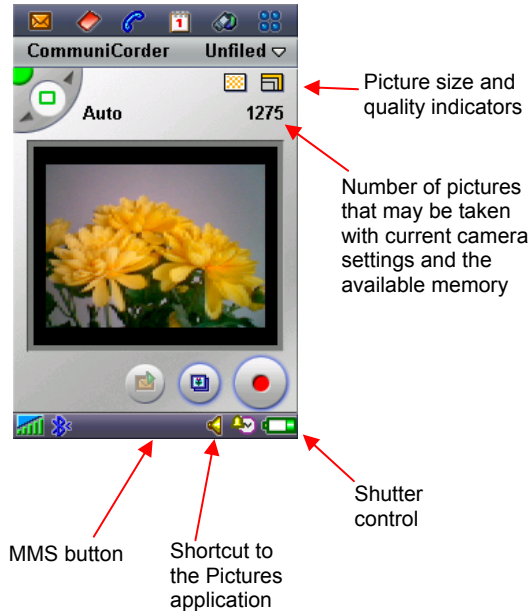
With the flip open the additional on-screen controls are:

- Shutter
- View all pictures (shortcut to Pictures).
- MMS (link to the Messages application). The last picture or video clip is automatically added to a new MMS message.

The mode control at the top left of the screen allows rapid selection of video or camera mode.
A number of preset options are available for video and camera mode:

- **Video** – sets video mode.
- **Auto** – automatic settings to suit the current lighting conditions.
- **Night** – preset for low light also the viewfinder refresh rate is reduced from 15 to 7 fps.
- **Indoor** – preset for typical indoor lighting.
- **Outdoor** – daylight settings.
- **Message picture** – creates QQVGA image that conforms with MMS specifications.
- **Message video –** sets video quality to a format that conforms with MMS specifications.

Manual control is available for a range of CommuniCorder settings:

- **Image size**
- **High/Medium/Low quality** (low uses least storage space).
- **Video clip size** (limit can be set in seconds or kilobytes).
- **Brightness** and **Contrast**
- **Backlight mode** (when there is light behind the subject in the viewfinder).
- **Flicker-free mode** (for fluorescent lighting).
- **Lighting** (automatic or one of 4 pre-set values).
- **Delay timer** (1 to 25 seconds between shutter operation and the picture being taken).
- **Picture freeze timer** (1 to 10 seconds following a picture being taken).

Pictures

Pictures is the P910i's image viewer. It enables you to view and organize your photographs, including pictures taken by the built-in CommuniCorder plus images loaded from elsewhere, such as received via email or stored on a Memory Stick. Pictures supports image types JPEG, BMP, GIF (including animated), MBM, PNG and WBMP.
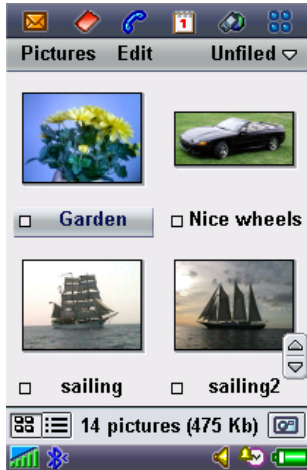
Images may be viewed in a list or as thumbnails and sorted by name, date, size or type. One or more pictures can be selected and then moved, copied or deleted.
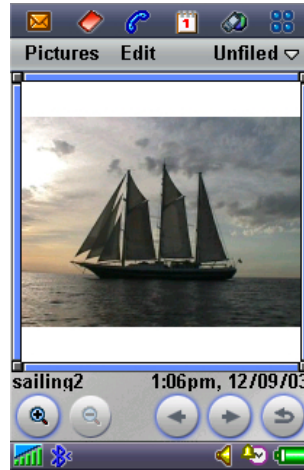
Tapping an image or image name in the List view launches the Detail view. Buttons are provided for zooming the image and browsing through pictures in the active directory. From the Edit menu, the Image editor application can be launched.

Images may be expanded to fit the width of the screen (portrait) or expanded and rotated to fit the full screen (landscape). In this mode the picture is displayed using 18 bit colour depth (262,144 colours).

Image Editor

Using the Image editor, it is possible to crop, rotate and resize JPEG images. The editor also includes tools for drawing on the image using the stylus. Different pen sizes and colours are available, as well as a text tool for formatting and inserting text into the image.

When creating MMS messages, the Image editor is used for editing inserted JPEG and BMP images as well as for creating simple JPEG images from scratch.

A simpler version of the Image editor is available for creating images for EMS messages.

Using Images
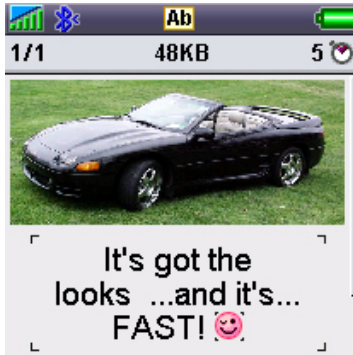
Pictures can be easily sent as a Multimedia Message. Simply select a picture, add a message and send just like an SMS or build a slide show with several images and your favourite sound clips.

Pictures of your friends can be saved in Contacts. When a contact calls (or you call that contact), the picture is displayed with the details of the call. This is known as 'Picture Phone Book'

Images may also be shared using Bluetooth or Infrared links.

Video Player

The P910i Video Player is used in Flip Open mode only.

Locally Stored Clips

Video clips may be downloaded from the Internet or copied over from a connected PC. Video files are large compared to still images. Video clips recorded on the P910i require approximately 1 MB storage per minute. Video files may be stored on Memory Stick as well as internal storage.

Files viewed on the P910i video player must be .3GP or .MP4, with video coded in MPEG-4 Simple Visual Profile and audio in AAC or AMR format.
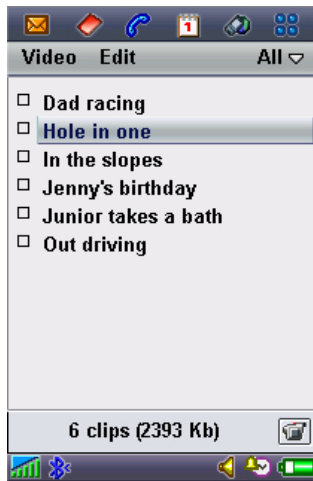
List view – videos may be sorted by name, date or size. One or more videos can be selected and then moved, copied or deleted. Tapping a title launches the Detail view.
A shortcut to the CommuniCorder application is provided.
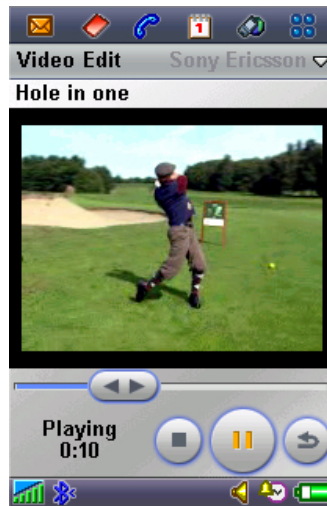
The Detail view is where the video is played. From the menu, the clip can be renamed, copied or deleted, or sent via Bluetooth, infrared or MMS.

The video may also be viewed in full screen. The video is played in landscape mode while maintaining the original aspect ratio.

Streaming Support in the P910i

The Video Player can be launched from hyperlinks in the Browser or in messages. Content is streamed using RTSP (Real Time Streaming Protocol) session control according to 3GPP specification.

Audio support is AAC and AMR according to 3GPP

3GPP specifies the following codecs:

- H.263 Profile 0 Level 10 (mandatory)
- MPEG-4 Visual Simple Profile Level 0 (optional)
- H263 Profile 3 Level 10 (optional)

The first two codecs are supported by the P910i.

Recommended Settings

The table shows the recommended video coder settings to optimize video for the P910i.

	Video Bandwidth	Video Size	Audio Sample/Bit Rate	Audio Channels
Video + AAC	64 Kbps	192 x 144	22.05 kHz / 32 Kbps	Stereo
Video + AMR	64 Kbps	192 x 144	8.00 kHz / 12.2 Kbps	Mono

Note: The P910i Video player application supports a maximum video size of 192x144, which is slightly larger than QCIF (176x144). The 3GPP standard is QCIF.

More information on video formats is available at www.SonyEricsson.com/developer.

Document Editors and Viewers

The P910i editors and viewers enable the user to manage and view different formats. There are separate editors for Microsoft® Word and Microsoft® Excel, and a viewer for Adobe® Acrobat® PDF files. Each editor or viewer will list the associated documents that it finds in the selected folder on the phone or on the Memory Stick.

Quickword
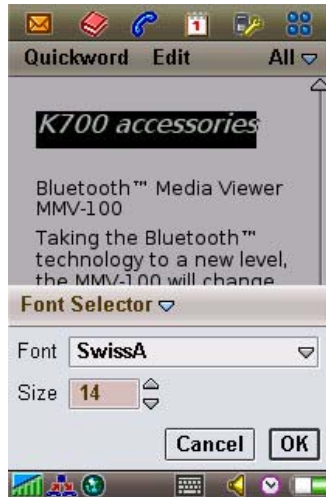
Quickword allows you to view and edit word processing documents on your P910i. In addition, you can use it to view and edit any of the thousands of e-texts available in the Palm OS standard DOC format.

Native PC format email attachments can be opened directly on the device without the need for conversion at a PC, edits to existing documents can be made even while preserving the original file integrity. Documents can be transferred to and from the phone via email, MMS, infrared, Bluetooth or a Memory Stick. Quickword opens files created with Microsoft Word 97, 2000, XP and 2003 that are saved in Microsoft .doc format.
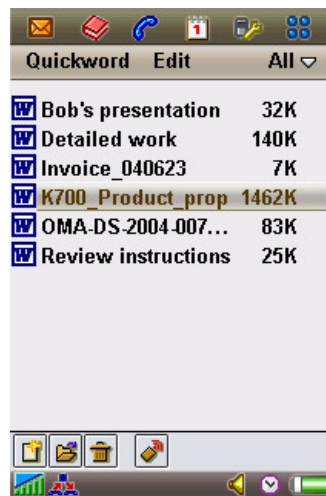
Quickword will launch automatically if an associated document is selected from, for example, the File manager or the email inbox.

When Quickword is started from the application launcher, the first view will be the Quickword File manager. This is a list of all the associated files in the selected folder (internal memory and Memory Stick). From this view, you can create new documents and open existing ones. You can also send documents using any of the methods available on the device (email, MMS, IR or Bluetooth).
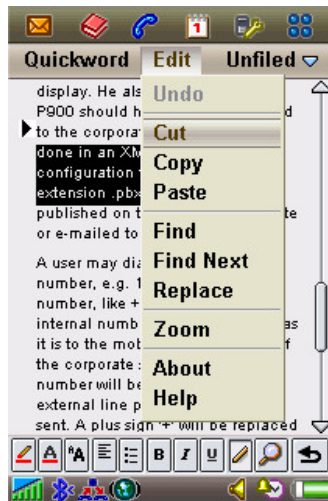
When a document is opened for editing, a copy of the document is created so that the original file is intact. When saving a file, Quickword will save it as a HTML file with .doc suffix. The html file can be opened in MS Word and then saved again in the native MS Word .doc format.

Key features:

- Advanced font control including typeface, size, bold, italics and underline.
- Format paragraphs with left, centre and right text justification.
- Advanced word processing features like Find and replace, and word count.

Pressing the pencil icon (third icon from the right) opens the edit mode. In this mode, the rest of the toolbar is highlighted and gives access to all the tools to the left of the pencil icon.
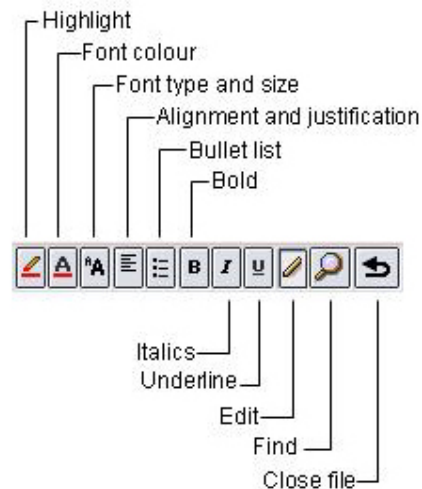
Quicksheet
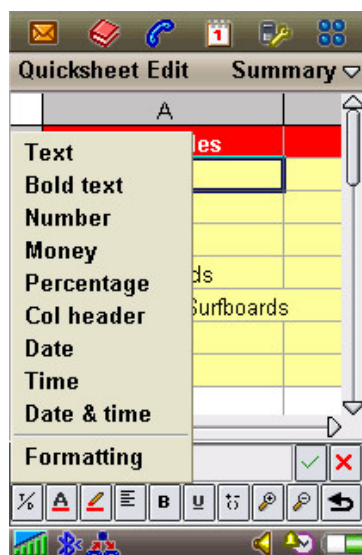
Quicksheet is a full function spreadsheet with Microsoft Excel compatibility. Quicksheet provides 84 of the most common formulas found in Microsoft Excel on the P910i.

These formulae include: financial, time and date, statistical, logical and lookup formulas.

Native PC format email attachments can be opened directly on the device without the need for conversion at a PC, edits to existing documents and spreadsheets can be made even while preserving the original file integrity.

Key features:

- Saves edited Excel files as *.xls files, fully compatible with Excel, while preserving the original file.
- Offers the most frequently used functions including scientific, financial, statistical, date and time, lookup, and aggregate functions plus sorting.
- Supports multiple sheets per workbook and allows linked sheets.
- Workbook model allows incremental save, save as, or cancel changes.
- Advanced cell editing features that allow easy creation and modification of spreadsheets.
- Cells can be formatted in a number of different ways using Cell Styles which allows naming the styles for easy reference.
- Supports column resizing, and cell locking with sheet protection to guard against accidental changes to critical formulas.
- Find and Find/Replace function.

Like Quickword, Quicksheet has its own File manager that lists all associated documents in the selected folder.

Quicksheet opens files created with Microsoft Excel 97, 2000, XP and 2003 and saved in Microsoft .xls format.

Quicksheet saves its files on the phone in a standard Microsoft format called mHTML. Older versions of Office (Office 2000 and Office 97) do not provide full support for this new mHTML format. To provide compatibility with these older versions of Office, a free add-in program can be downloaded, which will enable these versions of Office to properly open mHTML files created by Quickoffice.

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Pdf+
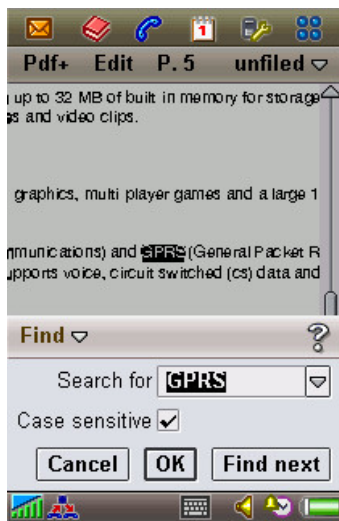
Pdf+ is a viewer for Portable Document Format (or PDF) files. Pdf+ reads and displays standard PDF files, without the need for conversion on a PC to a proprietary format.

With Pdf+ you can:

- View the text, line drawings and bit maps in the document.
- Browse the document, and go to a specific page.
- Wrap the text to make it fit the screen.
- Zoom in and out to maximize the amount of text and graphics you can read on the screen.
- Hide the title and the status pane to maximize the viewing area.
- Search for strings in the text of the document.
- View and follow bookmarks.
- Follow links to other pages in the document.
- Follow URLs if you have the web browser installed.
- Read files protected with an user password.
- Email PDF files to other people.
- Read PDF files that were sent to you as attachments.
- Manage your PDF files.

The 'Wrap' view displays the document so that as much text as possible is visible on the screen. Images and line drawings are not visible in this view.

Pdf+ can display a large number of PDF 1.0, 1.1, 1.2 and 1.3 files.

Limitations:

*Pdf+ doesn't handle the dynamic content of a PDF file.

*Pdf+ cannot render Type 0 and Type 3 fonts

Document Types Supported

Document type	Location	Features	Notes
Adobe® Acrobat® (PDF)	Phone	Viewer	
Microsoft® Excel	Phone	Editor	
Microsoft® PowerPoint®	CD	Viewer	Not preinstalled
Microsoft® Word	Phone	Editor	

Messages

The P910i Messages application has integrated support for SMS, EMS, MMS, and email from a unified interface. Messages may be addressed using the contacts data and hyperlinks are supported in all message types to create Email, call telephone numbers and navigate directly to web and WAP pages that are referenced in the text.
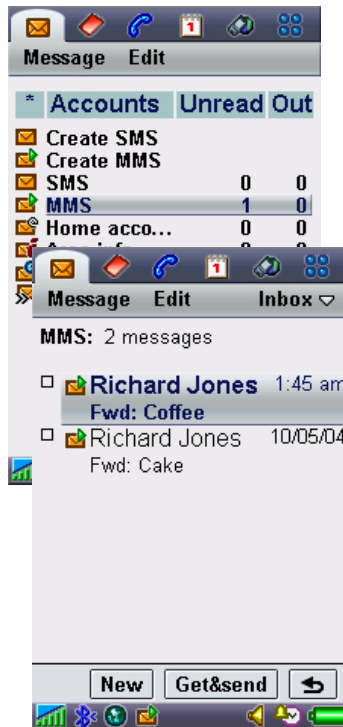
- **SMS** (Short Message Service): With SMS a user can send text messages containing up to 160 characters to and from GSM mobile stations (up to 70 characters using Chinese text). P910i also provides concatenated SMS, that is, the user can write a longer message and the P910i will automatically send it using more than one SMS.
  Over The Air setup messages are held in a special 'Auto Setup' mailbox
  Area information (SMS Cell Broadcast) is a type of text message sent to subscribers within a network area.

- **EMS** (Enhanced Messaging Service) enables the user to include graphics, sounds and font attributes as part of a text message, which can then be sent over the normal GSM/SMS service. Such messages may also be received and the extra media objects saved.

- **MMS** provides true multimedia capability with real pictures, sound and time-based sequencing.

- The **Email** client supports POP3 and IMAP4 email and multiple accounts may be set up, for example, business and personal. Attachment viewers are included for Microsoft® Word, Excel, PowerPoint® and Adobe® Acrobat® (PDF).

- Incoming beamed items will be found in the 'Beamed' mailbox

- **Push email.** P910i makes it possible for email clients to add an icon to the P910i status bar.

EMS (Enhanced Messaging Service)

Enhanced Messaging Service (EMS) adds powerful functionality to the well-known SMS standard. With it, mobile phone users can add life to SMS text messages in the form of pictures, animations, sound and formatted text. This gives the users new ways to express feelings, moods and personality in SMS messages. As well as messaging, users will enjoy collecting and swapping pictures, ring signals, and other melodies.

EMS uses existing SMS infrastructure and industry standards, keeping investments to a minimum for operators and providing a familiar user interface and compatibility with existing phones and with other manufacturers. EMS is part of the 3GPP standards.

An EMS message can be sent to a mobile phone that does not support EMS, or only supports part of EMS. All the EMS elements, that is, text formatting, pictures, animations and sounds are located in the message header. The EMS contents will be ignored by a receiving phone that does not support the standard. Only the text message will be displayed to the receiver. EMS is compatible to SMS across most of the range of mobile phones from the oldest to the newest.

Some companies in the mobile phone industry have developed their own messaging technologies, which only work with their own phone models. Network operators are in favour of EMS because it is universal – many of the major mobile phone manufacturers are constructively improving and developing the EMS standards even further for implementation in their products.

Examples of EMS contents and applications

A wide range of contents, applications and services may be developed. Below is a list of examples and areas where messaging can be enhanced with EMS:

- User-to-user message
- Message notifications for voicemail, email, unified messaging
- Illustrated news and commercials

EMS Media Objects in the P910i

Sounds and melodies
EMS sound is in the form of simple melodies according to the iMelody standard. Multiple sounds may be included in a message.

A library of sounds is included with the P910i. Additional sounds may be copied from incoming EMS messages and pasted in to a new message. Sounds from received messages can also be stored and accessed via the Select sound dialog.

EMS has pre-defined sounds such as 'Chime high' and 'Notify.' Rather than sending the complete sound to the receiving phone, EMS sends a 'token' instructing the receiving phone to play that sound according to its own library. When the P910i receives a message that includes an EMS pre-defined sound, it will be played in polyphonic form.

The P910i does not include a melody composer for EMS, but it is possible to set ringtones from melodies received in EMS messages.

Pictures and Animations
EMS pictures and animations are in the form of small bitmaps. These are transmitted in binary Black and White (meaning that there are no scales of grey in between). Multiple pictures can be added to a message.

Example 32 x 32 pixel pictures

A library of pictures is included with the P910i. Images are stored in the 'Predefined' folder (32 x 32 pixel images) and animations are stored in 'Predefined animations' (48 x 48 pixels). Images from received messages may also be saved. They are stored in a subfolder (called EMS) to the internal 'Images' folder, and available under 'Message images' within the EMS 'Select image' dialog. These images can then be edited and re-used, new images can be created using the Enhanced image editor.

Example stored colour animation for EMS

Pictures may be added to a message by copying and pasting them from received messages.

New images can be created using a simple grid and pen editor. Animations may not be created or edited.

EMS also has pre-defined images such as smilies. Rather than sending the smiley bitmap, a combination of characters is sent to instruct the receiving phone to display the pre-defined image. The P910i will display these images in colour, since a pre-defined image is always displayed from local P910i storage.

The P910i does not support the use of EMS to set background images because other methods are more appropriate for the large size and colour capability of the P910i's screen.

Text
There are 3 text font sizes. **Bold**, *italic,* underline and ~~strike through~~ styles are available, and text may be aligned left, centre or right.

Concatenated messages
A part of the EMS standard is the support for concatenated messages, which means that the phone is able to automatically combine several messages both when creating and receiving EMS. This is useful to be able to build and display messages with rich content, since the amount of information in each SMS is limited by the SMS standards.

EMS Display in the P910i
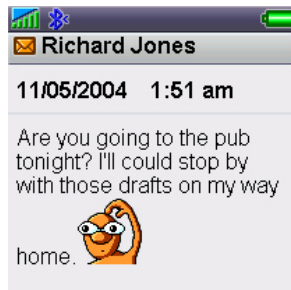
Receiving an EMS message in FC mode.

In the P910i, the extra facilities of EMS are integrated with the SMS UI, making it easy for the user to enrich an ordinary text message. A selection of icons and sound objects is included and more can be added via M-Services download.

Objects in received messages may be saved for re-use when composing outgoing messages, so as well as messaging users will enjoy collecting and swapping pictures, ring signals and other melodies.

Simply tap on the required object and select copy or save from the Edit menu.

One message may contain several EMS objects, such as pictures, animations and sounds.

Messages may be created using the keypad to enter text in FC mode, or using handwriting recognition or virtual keyboard in FO mode.

Composing an EMS message in FO mode.

MMS (Multimedia Messaging Service)

One of the key features in the P910i is the Multimedia Messaging Service (MMS), rapidly becoming the preferred messaging method of mobile terminal users, since the ability to send real pictures, video and sound greatly enhances the messaging experience. An MMS message from the P910i can contain text, graphics, animations, photographic images, audio clips, ring melodies and even a video clip.
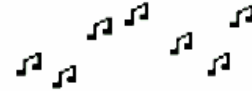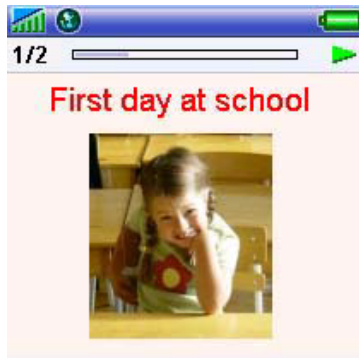
Defined and specified by 3GPP as a standard for third generation implementation, MMS completes the potential of messaging. Sending digital postcards and multiple-slide style presentations is expected to be among the most popular user applications of MMS. Eagerly awaited by young users in particular, MMS is projected to fuel the growth of related market segments. Using the Wireless Application Protocol (WAP) as bearer technology and powered by the high speed transmission technologies GPRS, EDGE and UMTS (W-CDMA), Multimedia Messaging allows users to send and receive messages that combine text and media in slides, having a built-in timing sequence decided by the sender. The messages may include combinations of text, graphics, photographic images, speech and music clips. MMS will serve as the default mode of messaging on all terminals, making total content exchange second nature. From utility to sheer fun, it offers benefits at every level and to every kind of user.

Benefits

Essentially enabling the mobile terminal to serve as image processor and conveyor, Multimedia Messaging accommodates the exchange of important visual information as readily as it facilitates fun. Business and leisure usage of MMS will be dynamically merged, resulting in enhanced personal efficiency for users and increased network activity for operators. In short, MMS affords total usage for total communication. Because MMS uses WAP as its bearer technology and is being standardised by 3GPP, it has wide industry support and offers full interoperability, which is a major benefit to service providers and end users. Ease-of-use resulting from both the gradual steps of the messaging evolution and the continuity of user experience gained from interoperability is assured.

The MMS server, through which MMS messages are sent, supports flexible addressing (to both normal phone numbers (MSISDN) and email accounts), which makes user interface more friendly and allows greater control for operators. The MMS server, moreover, is responsible for the instant delivery feature of MMS.

MMS objects

Although MMS is a direct descendant of SMS, the difference in content is dramatic. The size of an average SMS message is about 140 bytes, while the maximum size of an MMS message is limited only by the memory. Multimedia Messages will initially be in the range 30k-100 Kbytes. The P910i is optimized for messages up to 300 Kbytes. In the P910i, the MMS inbox is only constrained by the amount of storage available internally.

An MMS message can contain one or more of the following:

Text
Much larger amounts of text can be used in MMS messages when compared with SMS; thousands of characters can be included in a message. Text colour and size may be changed, and smilies may be inserted as with EMS messages.

Audio
MMS provides the ability to send and receive recorded audio and polyphonic sounds in messages. Not only can users share a favourite song or ring signal with a friend, they can also use the mobile phone to record sound and send it along with a message. Because sound includes speech as well as music, this extra dimension of an MMS message makes for enhanced immediacy of expression and communication. Rather than sending a downloaded birthday jingle in EMS, for example, a user can send a clip of his or her own personal rendition of 'Happy Birthday'.

Picture
With the built-in CommuniCorder, users can take a snapshot, or video clip, and immediately send it from the CommuniCorder application using the 'Send as MMS' menu option. Still pictures can also be taken directly from within the Messages application when creating new MMS messages. The ability to send pictures and video clips is one of the most exciting attributes of MMS, as it allows users to share meaningful moments with friends, family and colleagues.

Mobile picture transmission also offers inestimable utility in business applications, from sending on-site pictures of a construction project to capturing and storing an interesting design concept for later review. The ability to put text and pictures in a message allows users to create their own electronic postcards, an application that is expected to substantially cut into the traditional postcard-sending market.

The P910i supports the following image formats for MMS: GIF (including animated), JPEG, PNG, WBMP and BMP. Images may also be edited during message creation.

Scribble
A scribble is a simple image, such as a diagram, a cartoon or a roadmap, created from scratch by drawing with the stylus on the P910i screen. The built-in image editor lets the user select pen thickness and colour as well as insert text and crop, resize or rotate the picture.

Video
In addition to still pictures, it is possible to insert video in to an MMS. This may be a video clip recorded with the built-in CommuniCorder, or a downloaded video file. The MMS application is able to play video or streamed video. If a video clip is sent as an attachment, the video player is automatically launched when tapping the attached clip.

PIM Objects
With MMS in the P910i, it is easy to send and receive business cards (vCard), Calendar and Tasks entries (vCal) and Jotter notes (text content is added to a slide). Received PIM objects are listed under the 'Attachments' tab.

SMIL presentations

SMIL stands for Synchronised Multimedia Integration Language and is pronounced 'smile'. SMIL in the P910i allows the user to create and transmit multiple-slide style presentations on the mobile device. SMIL is an advanced XML-based protocol, and Sony Ericsson MMS supports a subset of this protocol. Using a simple media editor, users can incorporate audio and animated GIFs along with still images, animations and text to assemble full multimedia presentations. The idea of SMIL is to allow the user to customize the page timing in slide presentations. The user can decide in which order the image and text will be displayed, as
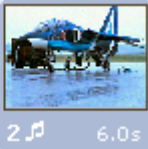
well as for how long the images and text lines are to be shown in the display. The user never sees the underlying SMIL code and does not need to understand it.

The P910i has an implementation of SMIL 2.0 Basic Profile. Messages created by the P910i use a subset of SMIL as defined in the Conformance Specification (see below).

SMIL Example

As an example, consider a two-slide message. In this case, it was created using the Sony Ericsson MMS Home Studio described in the Personalization and Customization section of this document.

	Slide 1	**Slide 2**
	Picture (Slide_1.jpg)	Picture (Slide_2.jpg)
	Text 'this is my new car'	No text
	Audio: Slide_1.midi	Audio: Slide_2.amr

The following files are used:

Name	Size	Type
mms	1 KB	SMIL Multimedia Presentation
Slide	1 KB	Text Document
Slide_1	13 KB	JPEG Image
Slide_1	11 KB	MIDI Sequence
Slide_2	8 KB	AMR File
Slide_2	10 KB	JPEG Image

Slide.txt contains the text for slide 1. The SMIL conveyed in the mms.smil file looks like this example:

```
<smil>
<head>
<meta name="generator" content="SEMC P9x0" />
<layout>
<root-layout width="160" height="160" />
<region id="Image" width="160" height="120" left="0" top="0" />
<region id="Text" width="160" height="20" left="0" top="120" />
</layout>
</head>
<body>
<par dur="35723ms">
<img src="Slide_1.jpg" region="Image" />
<audio src="slide_1.mid" end="35.723s" />
<text src="slide.txt" region="Text" />
</par>
<par dur="6.026s">
<img src="slide_2.jpg" region="Image" />
<audio src="slide_2.amr" end="6.026s" />
</par>
</body>
</smil>
```

The components of the message will be encapsulated, as in the example below:
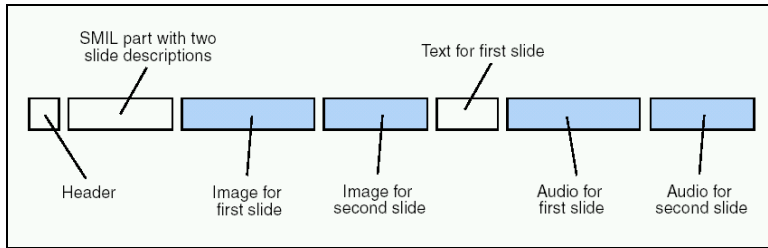
Media Object Timing

Timing of individual media objects must be within the overall slide time. This provides plenty of flexibility and greatly reduces the complexity of building a presentation.

The user may add text, an image and a sound clip to each slide. The timing of each object within the slide can be adjusted. The default timings are as follows:

Object type	Start Point (Seconds from start of slide)	Default Duration (Seconds)
Text	0	5 seconds
Image	0	5 seconds
Video	0	Duration of video [1]
Animation (GIF)	0	5 seconds
Audio	0	Duration of audio clip [1]
No Content	0	5 seconds

1. Assuming the length of the clip is more than 5 seconds. If the clip is shorter, default duration is 5 seconds.

The user is allowed to shorten the duration of a slide such that any media item would be truncated, but the media object timing must have been reduced first. The following example helps explain P910i timing behaviour:
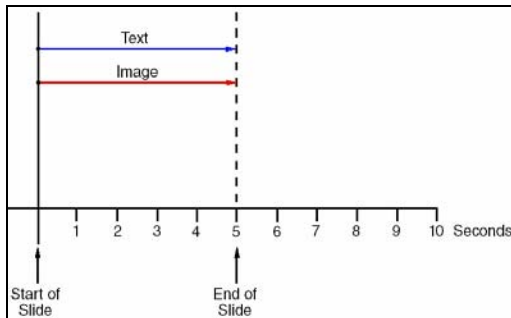
The user creates a new message using the Blank template. An image (still picture or video) and some text are then added. Both of these are set to last 5 seconds, which is the default duration of a slide.
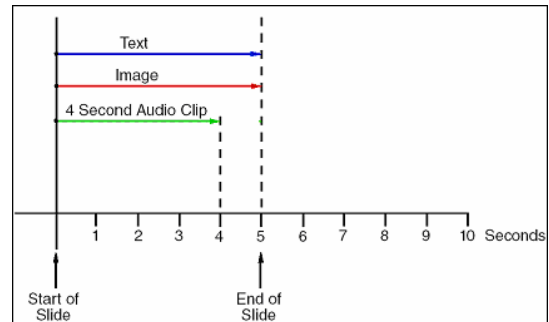
A 4 second audio clip is now added. The duration of the slide will remain at 5 seconds.
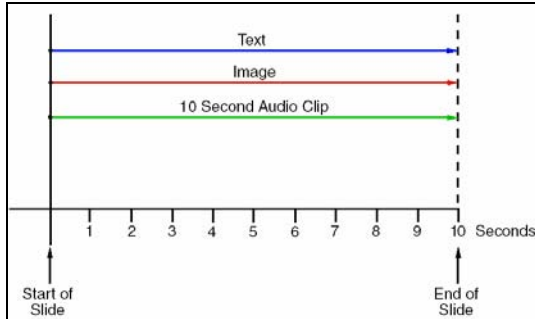
If a 10-second audio clip is added, the slide duration automatically increases to match. The user may reduce the duration of the audio, and the page time will reduce accordingly. The audio will be truncated after the newly set duration.

Templates

A template is a predefined message containing one or more slides. It may be modified by the user to quickly produce an attractive message. The Blank template is the default – in this case, nothing is pre-selected and the user may create slides as required.

The P910i comes with a number of pre-defined templates, all of which have sound and an animated image (GIF format, 160 x 120 pixels). These and other useful content pre-loaded by Sony Ericsson are described in Personalization and Customization on page 85.

Smart templates are also provided that will automatically launch the appropriate applications needed for each part of the MMS.

Users may store a favourite message as a template. User installed and ordinary pre-defined templates can be deleted. Smart templates may, however, not be deleted as they are used to provide QuickShare functionality.

Notification and download

When users have an incoming multimedia messages they will receive a notification, in the same way as for text messages. Users can specify if and when they wish to download the actual message. The following alternatives are available:

- On – always download the message automatically.
- Home only – messages are downloaded automatically only when connected to the home network.
- Off – messages have to be downloaded manually.

Also, additional restrictions can be placed on downloads:

- Message size – either no restriction, or smaller than a specified file size.
- Exclude Message classes – option to block Advertisements, and/or Information messages.
- Exclude Anonymous sender – option to exclude messages from senders not listed in Contacts, or where sender information has been hidden.

Interoperability and Conformance

The P910i is conformant with mandatory parts of OMA Multimedia Messaging Service version 1.2. The operator can customize which Content class the device should support. With no restrictions imposed, the P910i is a video rich device. However, it is not limited to the capabilities specified in the conformance document.

The user may choose for an alert to be shown if a message exceeds the MMS Content class. The setting is called 'Content alert' and may be found in Control panel, Messaging accounts, MMS, Advanced. Content alert is useful when sending messages to smaller less capable MMS phones.

Content alert can be set to either *Free*, *Warning*, or *Restricted*. *Free* means there are no restrictions. *Warning* will make a warning message display when attempting to add a non-conformant item to a multimedia message, or sending a message that is too large. The user can choose to ignore the warning and continue to compose and send the message. With Content Alert set to *Restricted*, it will not be possible to add non-compliant objects or send a non-compliant message. The Content class and Content alert setting can both be operator customized. The Content alert setting can be locked, and can also be hidden from the user.

Media Object Summary

The table below shows the media standards supported by MMS on the P910i.

Standard	Media Type
US-ASCII (IANA MIBEnum 3)	Text
UTF-8 (IANA MIBEnum 100)	Text
UTF-16 (IANA MIBEnum 1000) with explicit BOM (Byte Order Mark)	Text
UCS-2 ISO/IEC 10646	Text
AMR	Audio
AU	Audio
IMelody	Audio
MIDI	Audio
RMF	Audio
WAV	Audio
JPEG/JFIF	Image
GIF-87a	Image
GIF-89a (spec includes animation)	Image
WBMP	Image
BMP	Image
PNG	Image
3GP	Video
MPEG4	Video
PV-PVX	Video
SDP	Video stream

The MMS player will render all of the above formats. The display window for images is 200 x 170 pixels in FC mode and 200 x 200 pixels in FO mode. These are the optimal sizes for images where MMS messages are composed specifically for the P910i. Incoming images larger than this will be scaled down to fit the screen width, preserving aspect ratio.

Composing a multimedia message on the P910i

Multimedia messages may be created in FC or, as shown below, in FO mode.
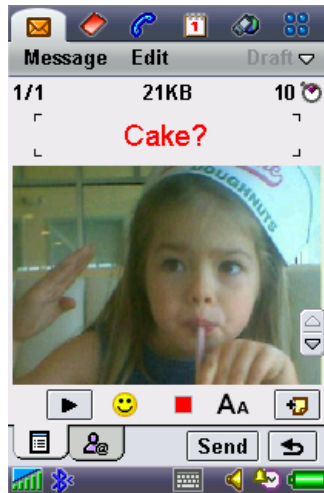
Composing a multimedia message is like building a small slide presentation. A typical slide will consist of a picture and text. Sound can be added to complete a slide. The user can select background colour, and the size and colour of text.

The user can set the duration of the slide. The default time is 5 seconds. If a sound or video is added, the slide duration is automatically set to the duration of the clip if it is longer than the default time of 5 seconds.

Slides can be chained together to make a sequence. Timing elements can be added to control the display of images and text within a slide. The user can preview the message before sending and make any timing adjustments via the UI. Slide order may also be changed.

Multimedia messages can be created using any suitable media in the user storage space – including media downloaded from the internet, synchronised from a PC or created on the P910i itself. Simply tap the placeholder in the slide template and select the required item.

An Image editor is provided so that images may be modified before sending. It can also be used to create drawings from scratch. The available functions are:

- Crop (Select a part of the picture)
- Rotate
- Pen (Draw on the picture in a choice of colour and thickness)
- Insertion and formatting of text
- Scale (Resize image)
- Undo operations

The pen function enables notes and drawings to be made on images. These become part of the image and cannot be erased separately from the image itself. The annotated image (with pen) is saved separately and sent with the message, leaving the original image unmarked.

The MMS message is compiled using MIME standards and consists of the following parts:

- One part containing the description of the slides, using MMS SMIL.
- One part containing the actual contents of the slides – text, images and sound.

Receiving a multimedia message

The user can choose to retrieve messages automatically, or just receive notifications of available messages. In the latter case, the user then manually selects which messages to download. Received messages are located in the MMS inbox.

| MMS playback in Flip closed mode | MMS Playback in Flip open, fullscreen mode. | MMS Playback in Flip open, edit mode. |
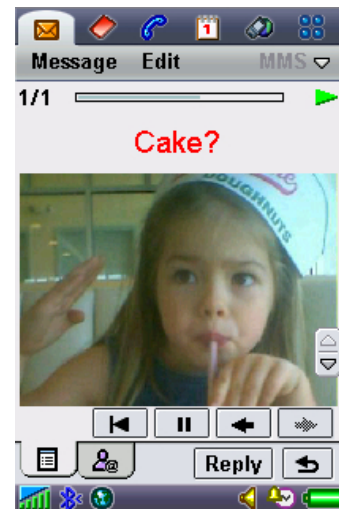
Receiving a multimedia message on other terminals

Interoperability is dependent upon the capability of the receiving terminal and the MMS server in the mobile network.

For example, the Sony Ericsson T610 is enhanced with MMS, enabling multimedia messages to be exchanged with excellent compatibility.

For a mobile without MMS, the text may be sent by SMS together with a URL, which enables the picture and message to be seen via the WAP browser.

Email

P910i Email Features

The P910i email client supports the following standards:

POP3	Post Office Protocol 3	POP is used to copy, move and delete messages from an incoming mail server in the network
IMAP4	Internet Message Access Protocol	IMAP is also used to copy, move and delete messages from an incoming mail server. IMAP has more features than POP such as remote folders.
SMTP	Simple Mail Transfer Protocol	SMTP is generally used to send messages from a mail client to a mail server.
MIME	Multipurpose Internet Mail Extension	MIME is a protocol describing data, for example, to define the attachments included in email.

These standards are supported by most Internet Service Providers and many corporate environments. Any number of email accounts may be set up – a typical configuration will be one business and one personal account. Over The Air (OTA) configuration of email and ISP accounts is supported.

Built-in password generators from RSA Security and Secure Computing make it possible for the P910i to connect to corporate networks which use these popular access controls, allowing corporate email to be used.

When connected via GPRS, automatic polling can be used so that email is automatically collected and presented in the Inbox. Controls are provided to filter messages based on size, enabling cost and download time to be managed. Another option enables only email headers to be presented in the inbox. Headers are quick to download. The user may read and select headers and request the message to be downloaded.

Attachments may be viewed using the viewers for Microsoft® Word, Excel, and Adobe® Acrobat® (PDF) located in the phone. See Viewer section for more information.

A signature may be set up so that essential details are automatically copied to the end of each outgoing email.

The supplied Sony Ericsson PC Suite enables email to be synchronised with Microsoft® Outlook® and Lotus® Notes®. During synchronisation, new email from the PC is transferred in to the corresponding 'Synchronized email account' inbox on the P910i. Messages and replies written using this account on the P910i are transferred and sent via the PC.

Web and WAP based email can, of course, be accessed using the P910i's browser.

Email Fetch and Delete Operation

The P910i is designed to work either as the only means of accessing email, or to work together with a PC which accesses the same email account. It is useful to explain how each case works.

Email account accessed by the P910i alone
The P910i Messages application fetches email from the POP server using the COPY method. This means that email messages are copied from the server and therefore two copies exist, one at the server and one in the P910i email inbox.

When the P910i connects to the POP server, an email synchronisation process takes place that follows these three simple rules:

- New incoming email messages are always copied to the P910i.
- Incoming messages deleted on the P910i will be deleted from the POP server during the next 'Get&Send'.
- Incoming messages deleted on the POP server by another email client, for example, on the user's PC, will be deleted from the P910i during the next 'Get&Send'.

Outgoing email is stored in the P910i and will need to be deleted, as required, to free up storage space.

Email account accessed by the P910i and another device

A common configuration is to use the P910i to access email while on the move, but to maintain a master copy of email on a PC. In this case, the email client on the PC must be set to copy from the server. For example, in Microsoft Outlook Express this is done by selecting Tools, Accounts, Properties, Advanced tab and then ticking 'Leave a copy of messages on server'.

All messages will now be received on both the P910i and the PC.

From time to time it will be necessary to delete messages on the P910i in order to create free storage. Before doing this, ensure that the PC has already collected the messages that will be deleted on the P910i.

Email account accessed by the P910i and another device – Alternative Setup

If the P910i is only used for reading mail when away from the PC and there is no need to retain any mail on the P910i after it has been copied to the PC then the following alternative may be preferred.

Leave the PC email client on the default setting of MOVE messages from the server (that is, do not leave a copy of the message on the server). In this case, the behaviour will be as follows:

- PC Sends and receives email before leaving the office.
- P910i inbox will be emptied if 'Get&Send' is performed immediately after the PC has checked for Email.
- New messages through the day will be received on the P910i.
- Upon return to the office, a Send and Receive on the PC will collect the day's messages, minus any that were deleted on the P910i. A 'Get&Send' is then performed on the P910i to empty its inbox.

Email folders

When selecting an account you have to bring up the list view. In the list view you can choose to see the different folders of the messaging account. By default Messaging accounts have the following folders: Inbox, Outbox, Draft and Sent. You can create additional folders if you want.

Remote folders

For IMAP4 type accounts you can subscribe to remote folders that are located on the server. Select **subscribe** from the folder menu.

Local folders

To improve the organization of your folders you can create more folders locally on your smartphone. All you have to do is to select **Edit folders** from the folder menu and then select **Add.** Folders created this way are only visible in the Messages application. Local folders cannot be created on the Memory Stick.

Push Email

Push email is a method of 'pushing' or forwarding email to mobile devices as soon as it reaches the email server. There is an increasing trend towards push solutions for mobile access to corporate email. These solutions may also include calendar and contacts synchronisation. Push email solutions allow high mobile email usability and allow email to be delivered in the background in the same way as SMS or MMS.

The P910i is well prepared for these solutions and a rich set of 3rd party applications are available from companies such as Extended Systems, Intellisync, JP Mobile, Research In Motion (RIM)/Blackberry, Seven, Smartner and Visto.

Push methods

The solutions use different methods to push the messages, usually IP push, either by listening to dedicated ports or by keeping a session active all the time, similar to instant messaging solutions. Some solutions may also use SMS with triggers to the application to start a sync/download, sometimes referred to as pseudo-push.

Security

All solutions use end-to-end security using SSL, 3DES or AES encryption. Most solutions are based on using a fixed password for push, however, normally not the network or email passwords. Initially key exchange is also done by using device parameters such as the IMEI number. A few solutions combine push with one-time passwords that are allowed to be used for a certain amount of time before being re-entered. Many solutions have functionality for enforcing screen passwords. There is also sometimes theft and loss protection through wipe-out commands and lock-out.

Area Information

Area Information, commonly known as SMS Cell Broadcast, is a method of sending text messages to mobile phones within a certain part of the network. For example, traffic news can be sent to users in a single cell or a group of cells. It is not widely deployed by network operators.

Information is organized into numbered channels. The user selects the required channels in the P910i Control Panel, Messaging Accounts, Area tab. The requested text messages are received and placed in the 'Area info' mailbox.

Cell Information may be switched on and off in the Control Panel. When enabled and supported by the network, the ID of the current cell (or group of cells) will be displayed underneath the network operator name in the FC phone display. This is often the telephone area code or postal code of the current location.

Browser, M-Services and MeT

The P910i features an integrated browser capable of browsing WAP, Web (HTML) and cHTML content from a common User Interface (UI).

P910i Browser

Overview

The P910i browser, called 'Internet,' enables you to find and display information on Web Sites on the Internet. Internet content can be displayed in two different ways:

- As you are used to seeing it on your computer, making it easier to recognize a page and find your way to your favourite spots.

- In Narrow layout. This is when the page is reformatted to fit the width of the screen.

One-hand navigation enables you to browse the Internet just using the Jog Dial.

Content Types Supported

The P910i browser supports all of the following content types within a single browser, directly or via a gateway/proxy.

World Wide Web (WWW) - HTML

The WWW is the most popular method of publishing information on the internet and on company intranets. Content is organized using the Hypertext Markup Language (HTML).

The P910i browser can read HTML pages and therefore gives access to a vast amount of existing material. Of course, much of the content on the WWW is aimed at large screens and will therefore require scrolling on the P910i. However, some websites, and more frequently those of interest to the mobile user, have 'low graphics' or 'mobile friendly' options, which are better suited to small screens.

HTML 3.2 is supported, minus some features that are applicable to large screen devices such as PCs. The main points to note are that the P910i browser has limited support for Frames or JavaScript

Wireless Application Protocol (WAP) - WML
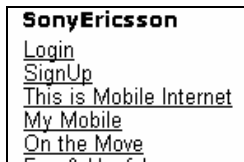
WAP uses Wireless Markup Language (WML), which is like HTML but specially optimized for mobile devices. The P910i browser is compliant with WML 1.3 and therefore gives access to a world of existing WAP content. The large touchscreen and multiple WAP accounts make it easy to access and surf WAP pages

Wireless Application Protocol (WAP) 2.0 – XHTML

Extensible Hypertext Markup Language, XHTML, is a combination of HTML 4.0 and XML, managed by the World Wide Web Consortium. XHTML Basic provides a common subset of features to enable the design of pages that will work on small handheld devices, yet rich enough for content authoring. In WAP 2.0, XHTML Basic is extended with additional mark-ups to create XHTML Mobile Profile. This is the core mark-up language for WAP 2.0.

WAP 2.0 introduces many new facilities including colour graphics, animation, large file downloading and improved menu handling.

The P910i browser supports XHTML Mobile Profile.

cHTML

Compact HTML is a version of HTML optimized for small handheld devices. It is widely used in Japan. The P910i browser will display cHTML content where it is available on the internet or from mobile operators over GSM/GPRS.

Browser User Interface

Normal layout

Narrow layout
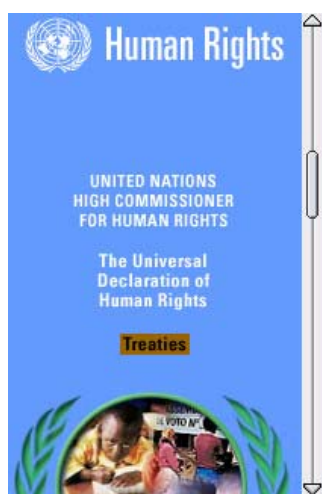
Full screen

The browser is always close at hand because of the dedicated hardware button. It may also be reached from the application picker and the application launcher.

The browser is used in FO mode. To switch to full screen, press the Internet button or select Edit ->Full screen. To switch back again press the Internet button or press the Jog Dial backwards. Pressing the Jog Dial forwards when in full screen mode brings up a menu with the most common commands.

To open a new URL, click the Internet menu and select Open Page. Local HTML content, for example, from the Memory Stick, can also be browsed.

The browser can display a Web page in two different ways:

*   As you are used to see it on your computer. This makes it easier for you to recognise the page and find the way to your favourite spots.
*   Reformatted to fit the width of the screen (Narrow layout). This means you don't have to scroll pages horizontally.

The touchscreen makes navigation very quick and simple – just tap a bookmark or a link to navigate. Tapping and holding a link brings up a menu with options to get link information, save it as a bookmark or open it. The Jog Dial can also be used to scroll the page. To work with an object on a page, such as an image, tap and hold it. A menu will be displayed listing available options such as Save, Copy, View and Send as.

One Hand Navigation
Web pages can also be browsed using only the Jog Dial. Select Narrow layout mode to avoid horizontal scrolling.

Hotspot navigation
Hotspots are links, radio buttons, check boxes, input fields, select lists and buttons on a Web page.

Rotate the Jog Dial slowly to select and scroll between hotspots. By pressing the Jog Dial inwards you can then:

*   Open a link or list.
*   Select a radio button.
*   Select or clear a check box.
*   Select an item in a list.
*   Press a button.

You can press the Jog Dial forwards to bring up a menu with useful commands. Use the Back command to go to the previous Web page.

Page scrolling
Rotate the Jog Dial faster to scroll the Web page up and down.

Scan text
To find the way to your favourite Web page spots, you can use the scan text function. Make sure no hotspot is selected and then press the Jog Dial inwards. You can also select **Scan text** from the **Internet** menu. The application will scan for and pan to the most text frequent part of the page.

Repeat the operation find the next text frequent area.

Bookmarks and other information are presented in a simple list view. Just tap the text of a bookmark to view the page. Tap the icon to view the bookmark details. Accounts may be stored in a bookmark, ensuring that the correct WAP/internet service provider is used to access the required page.

Pages may be saved to local storage. They are kept in the bookmarks list and may be opened offline.

WAP Push messages are received within the browser and presented in the list view.
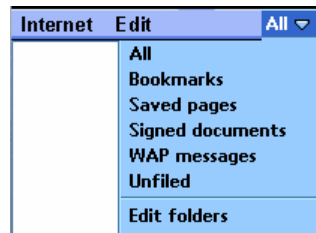
The user may organize bookmarks into user-defined folders, for example, creating a folder of sports bookmarks and a folder of transport bookmarks.

It is also possible to view a list of all signed documents (see MeT example above) and access incoming WAP Push messages.

Browser Security

World Wide Web

The P910i supports the TLS/SSL to provide a secure encrypted link between the browser and the website. This method is commonly used for secure transactions on the WWW. An icon in the display indicates when a secure connection is in use.

WAP Security

When using certain WAP services the user may want a secure connection between the phone and the WAP gateway, for example, when using banking services. An icon in the display indicates when a secure connection is used. The P910i is based on the WAP 2.0 specifications where security functionality is specified with a technology called Wireless Transport Layer Security (WTLS) and WAP TLS Profile.

The WAP protocols that handle the connection, its transport and its security are structured in protocol layers. The security is handled by the WTLS layer operating above the transport protocol layer. There are three WTLS classes that define the levels of security for a WTLS connection:

- WTLS class 1 involves encryption with no authentication.
- WTLS class 2 involves encryption with server authentication.
- WTLS class 3 involves encryption with both server and client authentication

Server authentication   Requires a server certificate stored at the server side and a trusted certificate stored at the client side.

Client authentication	Requires a client certificate stored at the client side and a trusted certificate stored at the server side.

A Wireless Identity Module (WIM) can contain both trusted and client certificates, private keys and algorithms needed for WTLS handshaking, encryption/decryption and digital signature generation. The WIM module can be placed on a SIM card and will then be referred to as a SWIM card.

Certificates

To use secure connections, the user needs to have certificates saved in the phone. User certificates can be downloaded. There are two types of certificates:

Certificate authority	A certificate used to verify that a WAP site is genuine. If the phone has a stored certificate of a certain type, it means the user can trust all WAP gateways which present a certificate that can be verified by the trusted certificate. Certificates can be preinstalled in the phone, pre-installed in the SWIM, or downloaded from the trusted supplier's WAP page.
User certificate	A personal certificate that verifies the user's identity. A bank that the user has a contract with may issue this kind of certificate. User certificates can be pre-installed in the SWIM card.

The P910i is loaded with WTLS/X509 certificates from Baltimore, Entrust, GlobalSign, GTE Cybertrust, RSA, Thawte and VeriSign.

WIM Locks (PIN Codes)

There are two types of WAP security locks (PIN codes) for the WIM on SIM. The locks protect the subscription from unauthorised use when browsing. The locks should typically be supplied from the supplier of the SWIM.

Access lock	An access lock protects the data in the WIM. The user is asked to enter the PIN code the first time the SWIM card is accessed when establishing a connection.
Signature lock	A signature lock is used for confirming transactions - like a digital signature.

Push Services

These are useful for sending updated WAP site contents or WAP links to mobile users. Examples of services that can be implemented using push services are:

- Notifications about new email and voice mail.
- News, sport results, weather forecasts, financial information such as stock quotes.
- Personal Information Manager (PIM) - delivery of contacts, meeting requests.
- Interactive games, for example, play poker with a friend.

There are two different forms of Push services: Service Indication and Service Loading. Reception of push messages and automatic load of URL (see below) may be turned on and off in the P910i user preference settings.

Service Indication (SI)

A Service Indication message contains a short text message and a URL. In the P910i, these types of messages are typically stored in the WAP messages inbox, which is integrated with the bookmark list in the browser application. When the user opens a message, both the text message and the URL will be displayed. The user has the options to postpone the message, load the URL or to delete the message.

Service Loading (SL)

A Service Loading message contains a URL. When such a message is sent to the P910i, the URL will automatically be loaded into the browser application if the user is currently browsing the same site; otherwise, it will be treated as a Service Indication message.

M-Services

M-Services are a set of feature guidelines published by the GSM Association with the support of leading mobile network operators and handset manufacturers. These include easy start-up for the user, better user experiences, easy download of contents, and simple charging models. Technically, the guidelines cover existing standards including WAP, MMS, EMS, SIM-AT and SyncML. Requirements are also made in the areas of UI, MIME descriptors, media formats and codecs.

For developers and operators, this means that a standardised yet rich set of services can be deployed simply. Users will be able to enjoy a new world of consistently available and advanced mobile Internet services such as:

- Pictures
- Backgrounds
- Screensavers
- Audio/Ring signals
- Games

The P910i's large colour touchscreen, dedicated browser access button and large amount of memory exceed the requirements of M-Services. The UI meets many of the recommendations. Since the P910i has a proper filing system for storage of media, download content is typically stored to file such that it is available to many applications including the P910i's personalization settings. The P910i supports both WAP Provisioning and the established Ericsson/Nokia OTA provisioning standards – see Personalization and Customization section for more details.

Opera Browser

The Opera browser is available on the CD for P910i. The Opera browser is also available for downloading on the web sites www.SonyEricsson.com and www.opera.com. The Opera browser has been designed to display practically all Web pages on the Internet. The browser supports the de facto HTML standard "street HTML" (used by most Web developers), JavaScript, Frames, and the ability to add plug-in applications. This means the users can access their favourite Web pages. The Opera browser is firstly an HTML browser. It also has support of full screen mode in the same way as the built-in browser.

Some key features:

- Small Screen Rendering: the page is reformatted to fit inside the screen width and eliminate the need for horizontal scrolling.
- Tap and hold on a bookmark displays the page in a new window.
- Tap and hold on a link gives the alternatives: "Open link" or "Open link in new window".

Support for TTY

A TTY (Teletype) device is used primarily by people who have a disability that makes the normal use of a mobile phone difficult. It is connected via the accessories connector at the base of the P910i, and the phone preferences must then be set for 'TTY Accessory'.

Normal calls may still be made while the P910i is in TTY mode only when a TTY is not attached. Other accessories such as handsfree will not work correctly. Also the flip should not be opened during a TTY call, as this will impair the quality of the connection.

Alternate Line Service (ALS)

General

ALS allows the user to have more than one line (more than one telephone number) allocated to a single SIM subscription. The user can select which line will be used for an outgoing call, while incoming calls can be received on either line at any time. However, the second line may only be used for speech calls.

If the user is not subscribed to the ALS service, then all of the ALS settings dialogs are hidden.

Line Naming

The default line names (line1/line2) may be changed by the user, for example, Business and Personal.

Line Selection and Indications

The currently selected line for outgoing calls is indicated by an icon. Tapping the icon allows the user to select the alternate line for making a call. When a call is received, the incoming call dialog will show which line the call is being received on.

Call Log

The call log entries will contain information which line was used for the incoming and outgoing call.

Line Facilities

Facilities such as Call Waiting, Call Barring, Call Divert, and Ring Tones may be setup and customized for each line individually. The P910i dialogs will automatically adjust to allow for the two lines when ALS is used. CSP settings are also individual to each line, but if there is only one CSP it will be applied to both lines.

Customer Service Profile (CSP)

General

A CSP held on a SIM card is able to automatically adjust the features provided by the phone so that particular features are not shown, typically by removing items from menus. However, some actions which are hidden may still be carried out using Service strings – the CSP does not prevent the user from doing this.

Alternate Line Service with CSP

ALS SIM subscriptions can have a CSP for each line. In that case, depending on the feature, it can be either the CSP of the selected line or the active line which is applicable. The selected line being the line on which outgoing calls will be made, and the active line the one on which a call is currently active.

If an ALS SIM has a CSP for Line1 only, then this CSP is used for both lines.

P910i Features Subject to CSP

Call Divert (Call Forwarding)

There is a separate CSP bit for each of the Call Divert settings:

- Call Forwarding Unconditional (CFU)
- Call Forwarding when Busy (CFB)
- Call Forwarding No Reply (CFNRy)
- Call Forwarding Not Reachable (CFNRc)

Call forwarding indicator

If the Divert all calls (CFU) setting is active on the network, the CFU indicator is shown on the status bar even if CFU is disabled by the CSP.

Call Transfer (CT)

It is the CSP of the active line that is applicable in this case.

Call Barring

The CSP of the selected line is applicable for Call barring.

There is a separate CSP bit for each of the individual Call barring settings:

- All Outgoing calls (BOAC)
- Outgoing International calls (BOIC)
- Outgoing International calls except Home (BOIC exHC)
- All Incoming calls (BAIC)
- All Incoming calls when Roaming (BIC Roam)

Multiparty calls (MPTY)

For the P910i MPTY means 'Conference calls'. It is the CSP of the active line which is applicable in this case.

Advice of Charge (AoC)

Irrespective of the CSP, AoC information is only shown if the SIM subscription supports it.

If this feature is prohibited then the Advice of charge dialog is not shown in the Phone preferences list (selected line CSP). Also:

- Cost information is not shown in the 'Total call information' dialog in the Call log. (selected line CSP)
- Cost information is not shown in the active call display (Active line CSP)

Call Hold (HOLD)

It is the CSP of the line on which the call is active that is applicable in this case.

Call Waiting (CW)

The CSP of the selected line is applicable for Call waiting.

Messages

The Messages application will not comply with the CSP.

ALS

Irrespective of the CSP, ALS information is only shown if the SIM subscription supports it.

CLIP

Not affected by CSP

CLI Send / CLI block

The CSP of the selected line is applicable for these settings. These are two individual features – 'Show my number' and 'Hide my number'.

Information numbers

The CSP of the selected line is applicable for Information numbers. Irrespective of the CSP, Information numbers are only shown if the SIM subscription supports it.

Flight Mode

What is Flight Mode?

GSM or Bluetooth radio signals from a mobile phone may be harmful to the safe operation of an aircraft.

Flight mode is a special mode of the P910i in which the phone does not transmit such signals, but allows the user to read and write information resident in the PDA part of the device.

How it works

1) Ordering the phone into or out of Flight Mode can be done in two different ways:

- From the Power Button
- From the Status bar signal strength icon

2) When going into Flight Mode

- The radio signal strength indicator, RSSI changes into a red circular Stop Symbol.
- The radio transmitters for both GSM and Bluetooth are switched off.
- The operator name is changed into "Flight Mode".

3) While in Flight Mode:

- The phone does not emit any intended radio signals.
- Unintentional signals caused by the electronics in the phone are at a similar level to other consumer electronic devices and do not exceed levels stated in FCC part 15, or EN550022.
- The phone can not by itself leave the Flight Mode.

4) When leaving the Flight Mode:

- The red circular Stop Symbol once again changes into the normal radio signal strength indicator, RSSI.
- The radio transmitters for both GSM and Bluetooth are switched on.
- The text "Flight Mode" is changed into an operator name.

Certification

The above facts are hereby stated and certified by us, the manufacturer, Sony Ericsson Mobile Communications AB, located in Stockholm, Sweden. There is no certificate from any independent certification authority.

Regulatory

Currently, the FAA has issued a document, USE OF PORTABLE ELECTRONIC DEVICES ABOARD AIRCRAFT, stipulating how airlines should handle these devices.

The EUROCAE (European Organization for Civil Aviation Equipment) released a document WG-58 (Working Group-58) that outlines tests and PED evaluation aboard European aircraft.

Standardization

It is the opinion of Sony Ericsson, that:

- Flight Mode ought to be standardized. Suitable bodies for this may be the FAA, IATA etc. Both the user interface and the procedures should be standardized.
- No new radio emission standards need to be set up for Flight Mode. Instead, existing standards should be applied, for example, FCC part 15 or ETSI EN550022.

Personalization and Customization

The P910i may be personalized by the user and customized at the factory:

- By the User (via the UI, including interactive M-Services).
- By the User via PC-based utility applications.
- Via Over The Air (OTA) configuration, initiated by operator, user or IT helpdesk.
- In the factory or at a Sony Ericsson Service Point, on behalf of a mobile operator.

User Personalization

Alterations to the appearance of many of the screens may be simply carried out through changing the phone's Theme. New Themes may be loaded on to the P910i from the internet and other sources. For more information see the Themes section on page 88.

Individual aspects of the phone's appearance may be altered as explained below.

Background and Application Shortcuts

The user may set a static image, or animated GIF, to be the background 'wallpaper' for the FC standby screen. Image size is 208 x 189 pixels and formats JPEG, GIF, BMP, WBMP, MBM and PNG are supported. Larger images, for example, a 640x480 picture from the CommuniCorder, will be resized to fit.

Correspondingly, a separate background can be set for the Application launcher view in FO. The size for FO background is 208 x 254 pixels. The same formats as for FC is supported, with the limitation that for an animated GIF file, only the first frame is displayed (as a static image).

Background images may be selected from internal or Memory Stick storage. They can also be downloaded via M-Services, beamed in to the P910i using Bluetooth or Infrared, or transferred in over the PC link.

The application shortcut buttons may be personalized by the user. In FC they will disappear after a short period to reveal more of the background image. Rotating the Jog Dial will redisplay them. The user may also select to have them displayed all the time. Backgrounds are set in Control Panel -> Device -> Display. A useful shortcut is to tap the battery icon in the FO Status Bar and select Settings. FC background can also be set directly from a received MMS message, and FO background can be set directly from the Pictures application.

Screen Saver

A 'screen saver' image is displayed after a period of inactivity. The user can switch this facility on and off and select the delay period before the screen saver is displayed. Image size is 208 by 320 and the format is the same as the FC background image above. Note that use of animated GIF increases power consumption. The top part of the image is displayed in FC mode and the entire image is displayed in FO mode.

Device lock may be used in combination with the screen saver. Upon pressing a button or touching the screen, the user will be prompted to activate keys and/or enter the device lock code.

When the screen saver is deactivated, the P910i will revert to the state it was in before the screen saver was activated.

Picture Phone Book

The user may store a picture of each contact in the Contacts application. When an incoming call is received with CLI matching that contact, the contact's picture will be displayed together with the other information. The contact's picture is also displayed when making a call, or using the speed dial screen in picture view mode.

Pictures are easily taken using the built-in CommuniCorder, though of course other images can be loaded in to Contacts. A copy of the picture is held in the Contacts database; therefore, the original picture may be deleted or renamed without losing the copy stored in Contacts.

Ringtones

The user can add as many ringtones as desired, subject only to available file space. Ringtones may be collected from many sources including Memory Stick, M-Services, MMS, EMS and transfer from a PC.

Any compatible audio file in the multimedia storage (Internal or Memory Stick) including MP3 can be selected as a ringtone. The P910i can play both iMelody format ringtones and the following polyphonic formats: AMR, AU, MIDI, RMF (Beatnik), MP3 and WAV.

A system default ringtone is provided. This is the ringtone when the P910i is first initialised. It cannot be deleted and is retained after a Master Reset.

The user may select a user default ringtone in the Phone application. In FO mode select Edit, Preferences, Sounds and alerts. This will now be played where no Personal ringtone is identified for the incoming call.

A Personal ringtone may be selected for a contact – simply select the required ringtone while entering or editing the contact's details. When the Calling Line Identification (CLI) of the incoming call is matched to a contact, the Personal ringtone for that contact will be played. If the ringtone has been deleted, moved, renamed or exists on a Memory Stick that is unplugged, then the system default ringtone will be played.

The flow diagram on the next page illustrates the logic for ringtone selection when an incoming call arrives.

If no CLI information is available, then only a default ringtone can be played. If the user has selected a personalized default ringtone and it is available (can be read from the internal storage or Memory Stick) then it will be played, otherwise the system default will be played.
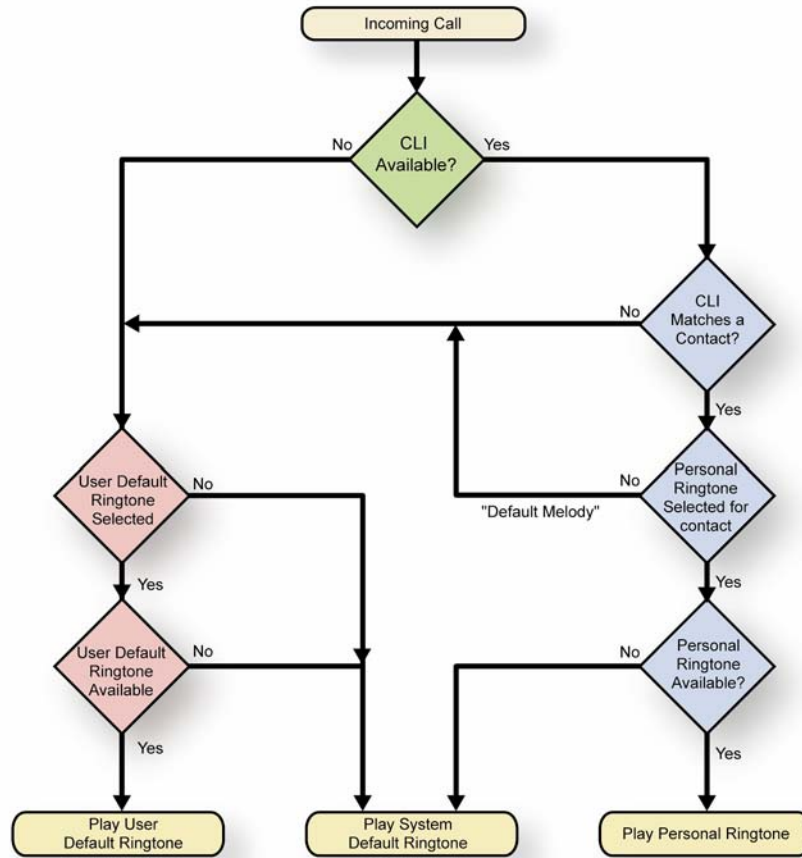
Other Audio Personalization

The following sounds may also be personalized in the P910i:

- Time (alarm)
- Calendar (reminder alerts)
- Tasks (reminder alerts)
- Messages (notification of new message)

Sony Ericsson Content

The P910i is supplied with a variety of multimedia material in order to demonstrate the applications and provide the user with a 'starter pack' of useful and fun content. The material supplied on the P910i itself is selected to be acceptable in all cultures and to be independent of time. More contemporary and localised content can be made available via download.

The content loaded in the internal storage (apart from EMS) can be deleted by the user and will be lost on Master Reset. However, it can be easily be downloaded from www.SonyEricsson.com and reinstalled. There are also links to these download pages on the Content and Application CD.

The content provided includes Background images, GIF animations, Screen savers, MMS pictures, Ringtones, Sound effects, Music, Video, and MMS templates.

Themes

A Theme is a way to provide a complete customized visual experience for the user.

Themes can define:

- Text, outline and background colours.
- Background images
- Graphical appearance of interface elements.
- Sounds for events, for example, ring signals, message alerts, notification, area info, auto set-up and reminder.

Themes can be created to support both Flip Open and Flip Closed modes.

A theme can include all these items, or just a select few.

Customizable items – Flip open mode

Customizable items – Flip closed mode

.

All Themes are based on 6 main colours:

A light colour
A mid colour
A dark colour
Each colour also has a complimentary text colour

A theme may also contain audio for the following events:
*   Ring signal (line 1, line 2 and data)
*   New message signal (sms, mms, email, beamed item, area info and auto setup
*   Calendar (alarm and reminder)

A Theme package is a standard zip file with the file extension .utz, containing several files.
Some of the files must match the definition given in a XML file in the theme package, while others must match the rules specific to P910i Theme extensions.

Over-The-Air (OTA) Configuration

OTA remote configuration provides simple set-up of services. The user is spared the task of finding complex technical information and then manually entering it via the UI. Instead, a web request or a call to be the mobile operator's helpdesk is all that is necessary – the appropriate settings can then be sent via SMS directly to the P910i.

OTA configuration using the Ericsson/Nokia Over The Air Settings Specification enables the following parameters to be provisioned:

*   WAP Account (Account name and WAP Gateway settings)
*   ISP Settings (Bearer information, username, password)
*   Bookmark (name and URL)
*   SyncML DS settings
*   MMS Settings

The following parameters may be remotely configured according to WAP Forum specifications:

*   WAP Account
*   ISP Settings

Further OTA configuration is provided using Nokia Smart Messaging. It is used to set up email accounts, specifically:

*   ISP (Bearer information, username, password, IP and DNS addresses, login script)
*   Email account (Username, password, address, server details)

Sony Ericsson WAP Configurator

Sony Ericsson's WAP Configurator provides WAP settings for many networks as a free service to owners of Sony Ericsson mobile phones. It may be found at www.SonyEricsson.com/.

Factory Customization

Factory Customization will be available to mobile operators and volume customers. This enables the hardware, applications, settings and media to be tailored to customer needs, including:

- Customized One-button Internet Access.
- Pre-configured settings such as ISP, homepage and GPRS.
- Pre-loaded content, including screensavers, backgrounds, ringtones, local WAP/WEB pages, pictures, and demonstration MMS messages.
- Bookmarks
- Pre-loaded applications. Games, extended security, 3rd party applications.
- Calendar, contacts, Jotter notes, etc.
- Certificates
- Customized Flip
- SIM lock

Customization is carried out by loading the P910i with a uniquely identifiable Customization package, made up from the following elements:

- Default values for user configurable settings.
- Default values for hidden settings (settings unavailable to the user via the UI. Hidden settings are used to switch between Customization alternatives anticipated in the generic system software.).
- Preloaded user data (content such as welcome documents and messages, notes and contacts).
- Preinstalled executables (executable wizards, 3rd party applications, and so on).

Bluetooth^{TM} Wireless Technology

The P910i features built-in Bluetooth wireless technology. Its short-range radio link operates in the globally available 2.4 GHz frequency band, ensuring fast and secure communications up to a range of 10 metres.

Bluetooth wireless technology is designed to operate also in noisy radio frequency environments, providing reliable and high data throughput. To achieve this, techniques such as frequency hopping and error correction are used. To enforce data security, data can optionally be encrypted.

Bluetooth wireless technology facilitates instant connections, which are maintained even when the devices are not within line of sight. High-quality voice transmission is provided under adverse conditions, making it possible to use a headset connection to the P910i at all times.

Sony Ericsson is a founding partner of the Bluetooth Special Interest Group (SIG). Examples of Bluetooth wireless technology devices that are available now or are expected to be available in the near future include:

- Stereo headsets for listening to music.
- Headsets for wireless voice transmission and remote call control.
- PCs, laptops, PDAs, palmpads for data transfer, synchronization and so on.
- MP3 music players
- Other phones for exchanging business cards, ring signals, playing games etc.
- Household appliances with built-in logic, as well as games and entertainment devices.
- Digital still and motion video cameras.
- Handheld scanners for text, barcodes and images.
- Access points in hotel lobbies and airports for connecting to computer networks and the Internet.

Please note that restrictions upon the use of Bluetooth may exist in a few countries. Contact a Sony Ericsson representative to check if the use of Bluetooth is restricted in your country or region. If you are unsure, the Bluetooth function should be switched off until you know the possible scope of any restrictions.

Benefits of Bluetooth wireless technology in the P910i

No cables	Bluetooth wireless technology gives a true wireless connection to headset, computers, networks, printers and other devices.
Radio Link	Bluetooth does not require line-of-sight alignment. For example, when using the P910i to connect a laptop to the internet, a Bluetooth link between the laptop and the P910i can be established even when the P910i is placed in a jacket pocket, or placed near a window for better GSM/GPRS reception.
Several devices	The P910i can maintain several devices, which you trust, in a pairing list, enabling rapid and safe connection when those devices are in range.
Multilink	The P910i can maintain connections with several devices simultaneously.
High transmission speed	Comparable to IR or cable.
Secure and fast	Data connection with a Bluetooth PC/laptop turns the phone into a modem for connecting to the Internet and for data transfer.
Synchronisation	Fast synchronisation of calendar and phone book with PC/laptop and PDA.
Beaming	Quick exchange of business cards, calendar events and melodies with other phones and devices. Via the File Transfer Profile it is possible to exchange any type of file with, for example, a PC that supports the File Transfer Profile.
Power save mode	The phone uses sniff mode on headset and handsfree connections which means reduced power consumption and shorter connection set-up times.

P910i Bluetooth transfer methods

P910i supports both the OPP (Object Push Profile) and FTP transfer methods between devices. While the P910i can exchange any type of item using the OPP method, other devices may be restricted to exchanging only vCards by OPP. Personal Computers and PDA devices often support the Bluetooth FTP transfer method, thus the FTP method of transfer opens up wider possibilities.

When selecting the 'Send as' transfer method, OPP transfer is seen as simply 'Bluetooth', while the 'Bluetooth shared' item is used for the FTP method. When the 'Bluetooth shared' method is chosen the item is moved to the Shared folder within the messages beamed folder. Once a Bluetooth FTP transfer link has been established from another device, its user may browse the Shared folder – but only after access permission has been granted by the user of the P910i.

Bluetooth applications with the P910i

Bluetooth Headset

- Make and receive calls using the buttons on the handset and voice command.
- Multiple headsets can be defined, for example, a Bluetooth personal headset and a Bluetooth car kit.

Laptop PC / PDA

- Connect to P910i over Bluetooth and use it as a modem to connect to the Internet.
- Synchronise data.

Mobile Devices

- Share business cards and appointments using vCard and Vcal
- Share photographs and sound clips

Synchronisation and Data Transfer

In everyday life, access to an updated calendar and details of friends and business colleagues is greatly appreciated. To be truly mobile, users must be able to carry their important information with them. Equipping mobile phones with Personal Information Manager (PIM) programs like calendars, task lists and address books gives users access to their most important data anywhere and anytime. The information is kept updated by synchronising with the information at the office or at home. The growing use of groupware such as Microsoft® Outlook® and Lotus® Notes® means that more and more meetings are booked electronically in daily business life.

The P910i uses the SyncML protocol for synchronisation. This means that it has compatibility to synchronise with a wide variety of devices over a number of different communications media.

SyncML – An Open Standard for Synchronisation

SyncML Background

Leading the way in providing remote synchronisation capability, Sony Ericsson realises that interoperability of remote synchronisation is of utmost importance if mobile data usage is to become as widespread as generally predicted. That is why Ericsson, along with IBM, Lotus, Motorola, Matsushita, Nokia, Palm Inc., Psion and Starfish Software, founded the SyncML initiative in February 2000. Supported by more than 600 software and hardware developers, the SyncML initiative seeks to develop and promote a globally open standard for remote synchronisation, called SyncML. Unlike many other synchronisation platforms, SyncML is an open industry specification that offers universal interoperability. Because it uses a common language – XML - for specifying the messages that synchronise devices and applications, SyncML has been called the only truly future-proof platform for enabling reliable and immediate update of data. The benefit for the end user is that SyncML can be used almost anywhere and in a wide variety of devices, regardless of application or operating system. In October 2002, the SyncML Initiative Ltd merged with OMA, and the ongoing work regarding the SyncML standard is now carried out in OMA.

What is SyncML?

SyncML is the common language for synchronising all devices and applications over any network. SyncML leverages Extensible Markup Language (XML), making SyncML a truly future-proof platform. With SyncML any personal information, such as email, calendars, task lists, contact information and other relevant data, will be consistent, accessible and up to date, no matter where the information is stored. For example, a calendar entry made to a mobile device on a business trip is equally available to a secretary in a network calendar. SyncML is the ultimate choice for remote synchronisation.

The P910i uses SyncML for both local synchronisation (for example, with a PC using Bluetooth or a cable connection) and remote synchronisation over HTTP.

SyncML Protocol Architecture
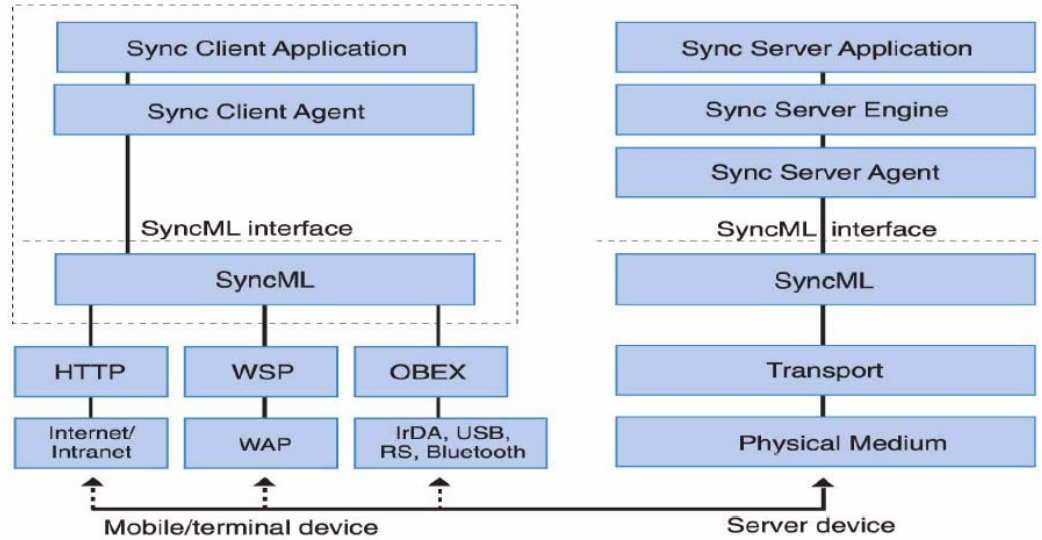
Benefits of a common synchronization protocol

End users
Today's user of mobile devices probably uses a different synchronization product with every device. Each technology can synchronize only a few applications, or is limited to a particular type of network connection. This arrangement is expensive to install, confusing to configure and operate, and costly to administer. With SyncML, users will be able to buy devices that synchronize with a broader range of data.

Device manufacturers
Device manufacturers will benefit from a common protocol that will make the device interoperable with a broader range of applications, services, and network and transmission technologies.

Service providers
Service providers moving into the growth area of application hosting are particularly concerned that a proliferation of synchronization technologies will make it impossible to deploy and support their customers in a cost-effective manner. To support the range of data types and devices in use today, service providers must install and configure multiple server infrastructures, maintain and support that infrastructure, and maintain compatibility and performance. The alternative now available, to use a single solution for data connectivity, involves the risk of a tight coupling to a propriety solution. With SyncML, they will be able to provide connectivity to a wider selection of applications.

Application developers
Choosing to support multiple synchronization technologies enables an application to support more types of devices and networked data, but that choice comes at a cost. With SyncML, application developers will be able to develop an application that can connect to a more diverse set of devices and network data.

Network operators
As multiple applications that need remote synchronization over WAP are developed, there will be an automatic growth of revenue for network operators.

Which information can be synchronised?

The P910i supports synchronisation of the following data types:

Application	Remote Sync	Local Sync
Contacts	✓	✓
Calendar	✓	✓
Tasks	✓	✓
Jotter (text part only)	**	✓
Email	**	✓

** The Email and Jotter implementations are proprietary and therefore not SyncML compliant. Note that email can of course be fetched remotely using the Messages application.

Remote Synchronisation

Remote synchronisation takes place over the air using HTTP and is the ideal way to keep the P910i up to date. Using GPRS, the P910i can be continuously connected to the remote synchronisation server.
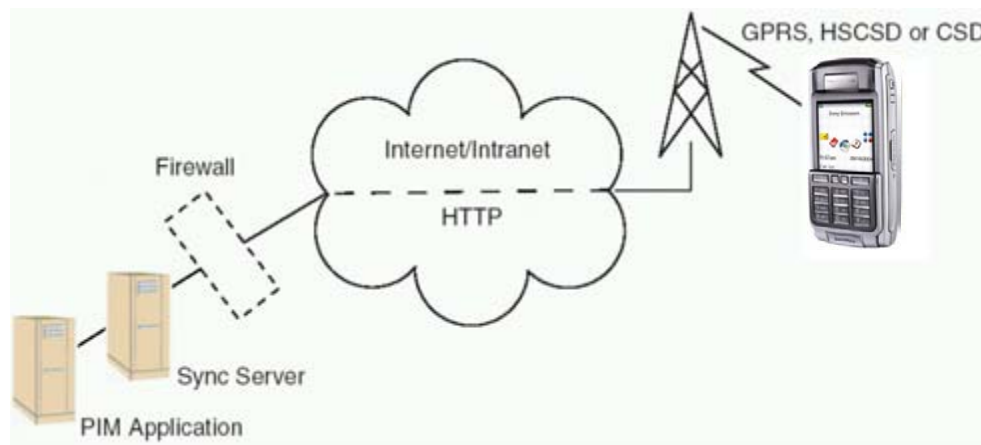
Synchronisation services will be offered by mobile operators, third-party service providers and as added capability to corporate PIM applications. Corporate PIM applications such as Microsoft® Exchange and Lotus® Notes® can be supplemented with SyncML capability.

Apple® iSync

The latest version of Apple's iSync supports the P910i. Using Bluetooth, iSync can synchronize Contacts, Calendar and To Do items between a P910i and a Mac computer.

Object Exchange – 'Send as'

The P910i makes it easy to transfer objects over Bluetooth, infrared and Messages. This is presented to the user via 'Send as' commands in applications. Simply select an item such as a contact, select 'Send as' and select the method to be used for sending. Typical applications are to beam an appointment to other people, or to receive a new background image.

Bearer > Application (Data Type)	IR	Bluetooth	SMS	MMS	Email
Contact (vCard)	✓	✓	✓	✓	✓
Appointment (vCal)	✓	✓	✓	✓	✓
Tasks (vCal)	✓	✓	✓	✓	✓
Jotter **	✓	✓	✓	✓	✓
Image	✓	✓		✓	✓
Sound Clip (Ringtone)	✓	✓		✓	✓
Bookmark	✓	✓	✓	✓	✓
Sound recorder (Voice Notes)	✓	✓		✓	✓
Third Party Applications ('Send as' API)	✓	✓		✓	✓

** SMS is text only; option to send the picture as GIF using the other bearers.

Note that the P910i Messages application enables the user to add objects into EMS and MMS messages. See the Messages section on page 59 for more information.

To perform a 'Send as' beam operation using infrared, the two devices are lined up and the sender initiates the transfer.

To beam over Bluetooth, a scan finds the other devices within range. The user can then select the required device and send the information across.

When sending over SMS, MMS or email, the required message type is created with the selected object attached. It is then sent over the air.

Sony Ericsson PC Suite

Local Synchronisation

The P910i is supplied with PC software for local synchronisation. It may be loaded from the Sony Ericsson PC Suite CD-ROM.
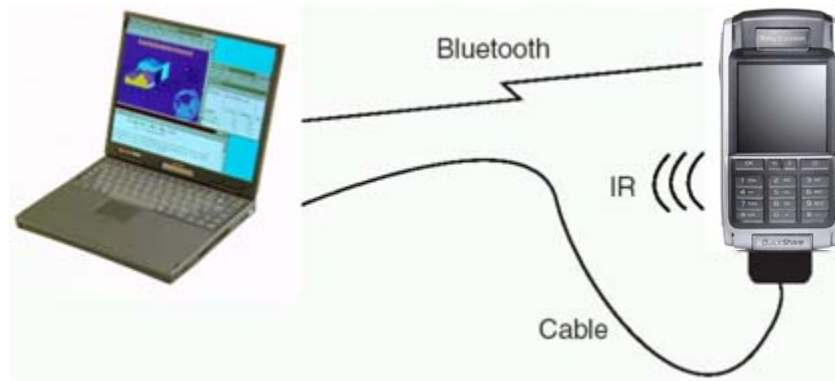
Bluetooth, Infrared or Cable
The P910i always synchronises using SyncML, regardless of connection type. It connects via Bluetooth wireless technology, infrared or cable. The cable is connected either directly to the phone or to the desktop charger.

Automatic synchronisation
Synchronisation can be configured to start automatically, given that a suitable synchronisation program must be running on the other device:

- When the USB cable is plugged in to the P910i.
- When the P910i is placed in to the SyncStation and the SyncStation is connected to the other device.
- When Bluetooth is activated on both devices and they come into operating range
- When infrared is activated on both devices and the infrared sensors are aligned.

Intelligent process
A synchronisation engine performs the task of synchronising. For local synchronisation, the synchronisation engine is an application that runs on the desktop computer. The synchronisation engine compares, updates, and resolves conflicts to ensure that the information in the phone is the same as that in the computer.

Compatibility
The supplied PC software enables synchronisation with the following applications:

- Lotus® Organizer® 5, 6
- Lotus® Notes® 4.6, 5.0, 6.0, 6.5
- Microsoft® Outlook® 98, 2000, 2002, 2003

The PC requirements are as follows:

- Microsoft® Windows® XP, 2000, Me, 98 or 98SE.
- Minimum recommended hardware configuration for the version of Windows in use.
- 100 MB free space on hard disk

File Transfer Utility

A utility is provided which enables files to be transferred to and from a P910i connected to a PC. It makes the P910i appear as a device in Windows Explorer. The Internal Storage and Memory Stick appear as two drives connected to the device:

Folders	Name	Size	Type	Modified
Desktop	alan partridge - ge...	806 KB	MP3 Format Sound	2002-07-11 07:11:10
My Documents	Cunning plan	97,6 KB	MP3 Format Sound	2003-04-01 07:59:06
SEKIW773	Hand me the pepper	3,23 MB	MP3 Format Sound	2004-05-07 05:09:58
My Network Places	Why Aye Man	1,52 MB	MP3 Format Sound	2003-07-23 17:33:08
Recycle Bin	Working on it	1,06 MB	MP3 Format Sound	2003-07-24 22:20:50

Folders tree:
- My P910i
  - My P910
    - Phone Memory
      - audio
        - MyMP3
        - QuickTimer
        - Sony Ericsson
        - unfiled
      - document
        - Journals
        - Meetings
        - Unfiled
      - image
        - scap
        - Sony Ericsson
        - Summer pics
        - unfiled
      - other
      - video
        - Funny clips
        - Sony Ericsson
        - unfiled
    - Memory Stick
      - audio
        - Blues
        - Classical
        - Jazz
        - unfiled
      - document
        - ROMS
        - unfiled
      - image
        - unfiled
      - other
      - video
        - unfiled

View of the P910i internal and Memory Stick storage in Windows Explorer.

Typical uses for this include:

- Archiving pictures taken on the P910i to PC storage
- Storing MP3 files on the P910i or the Memory Stick
- Moving images to the P910i to use in personalization, MMS messages etc.
- Moving sound clips to the P910i for personalization.
- Store work documents (Word, Excel etc) on the P910i to read while on the move.

Backup and Restore

Backup is initiated from the connected PC. Note that the SyncStation desk stand must be used for backup. Infrared or Bluetooth wireless technology cannot be used for this. Files in the user data area (which includes loaded third party applications) are backed up to PC storage.

The restore utility takes stored data from the PC and places it back on to the P910i.

Language Change Utility (Standard P910i and P910a only)

The P910i has a larger, richer UI compared to an ordinary mobile phone. Applications often have help information also. Consequently, it is impractical to store many languages on a standard P910i at the same time. To facilitate language change, a PC utility is provided which enables the required language to be loaded on to the P910i. The Language Change Utility is not available for Chinese models.

Software Installation Utility

This utility enables P910i applications to be installed from the PC.

Dial-Up Networking Wizard

This utility assists the user to create GPRS, HSCSD and CSD connection definitions in the Windows Dial-Up Networking folder. All the necessary information can be entered in a logical way. Set Infrared status to Modem in the Control Panel to use this facility over infrared.
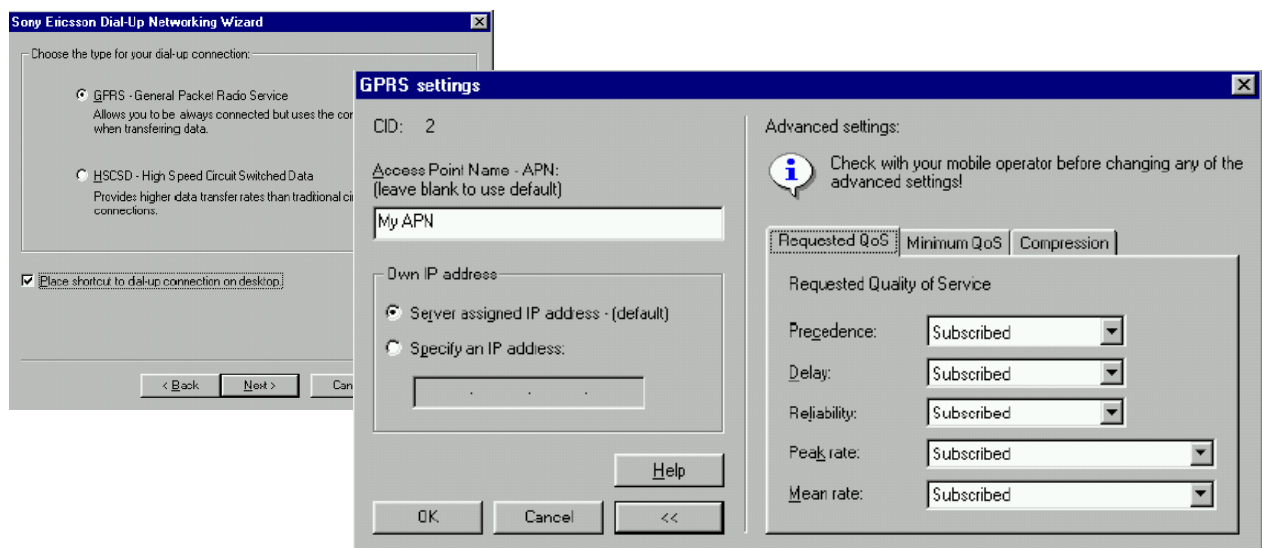
Drivers

• Drivers for USB and using the P910i as a modem

DRM

Digital Rights Management, DRM, is a technology that enables secure distribution, promotion, and sale of digital media. Examples of such content include personal images, wallpapers and screen savers with themes from films, ringtones from musical artists, and branded games. In other words, content providers can control how users may use different types of content in devices, such as mobile phones, smart phones or PDAs. Content providers can also control the use of content in related services, such as MMS. Sony Ericsson is actively focusing on technology standardization for the DRM concept, and supports the ongoing standardization work and activities of the OMA (Open Mobile Alliance). Sony Ericsson is fully committed to open standard solutions in the mobile environment and is a principal driver of many open standard initiatives. This will ensure the interoperability of mobile terminals in the DRM area and also result in a strong, competitive DRM standard.

Forward lock

P910i supports OMA DRM Forward lock which is the simplest OMA DRM case, with no special rights defined. The content is just put into a DRM package, thus protected from being copied out from the device by the user. It is useful for all types of content that the provider wants to charge for. Forward lock content will normally be received by a P910i as part of an MMS message via HTTP download. P910i supports OMA Download with separate delivery of download descriptor and media object, but does not support handling of rights. More information is available at www.SonyEricsson.com/developer.

Protection properties

Content protection according to the OMA DRM standard gets special properties. Content with Forward lock protection cannot be further distributed: The user cannot copy the content to other devices since the "Send to" option is disabled for pictures, ringtones, etc. that are protected with Forward lock. In addition, content with Forward lock cannot be stored on the Memory Stick and it is not visible when browsing files using the File manager or, when connected to a PC, from Windows Explorer.

DRM packager

A DRM packager is typically included in the software used by the content provider. It is used to create the DRM package that is delivered to the device, including content and associated rights.

GPRS, HSCSD and CSD Connections

The introduction of GPRS (General Packet Radio Services) is one of the key steps in the evolution of today's GSM networks for enhancing the capabilities of data communication. Data traffic is increasing enormously (over both wired and wireless networks), with the growth in demand for Internet access and services paralleling that for mobile communications. Users want access to the Internet while they are away from their offices and homes, and surveys have found that the vast majority of business professionals want the ability to send and receive email, browse the Web and transmit text and graphics on a portable device. That is why the main applications driving Mobile Internet development are email clients and Web browsers.

The demand for high-speed Internet access will be the key driver for coming generations of wireless services, and GPRS can deliver the necessary speed. GPRS allows innovative services to be created, enabling new and previously inaccessible market segments to be addressed and increasing customer loyalty.

GPRS applications can be developed for both horizontal and vertical markets. Vertical applications are specific, including those for operations such as reaching police and emergency, taxi, delivery or automated services (vending machines, supervision, vehicle tracking). Horizontal applications are more generic and include those for Internet access, email, messaging, e-commerce and entertainment.

GPRS is able to take advantage of the global coverage of existing GSM networks. Applications developed for GPRS can be deployed on a large scale and can reap the associated benefits. GPRS also provides a medium for secure connections to private networks, banking and financial services.

The P910i supports connection to the Internet, company intranets and mobile operator WAP services over GPRS, HSCSD and CSD. A typical configuration will be to use GPRS for a continuous connection to the net. With GPRS, the P910i sends data in 'packets' at a very high speed. The P910i remains connected to the network at all times, using transmission capacity only when data are sent or received. This means that the email client and the browser are always available for immediate use. Third Party applications such as instant messaging clients will also benefit from a GPRS 'always on' connection.

Using the P910i as a Modem

The P910i contains a complete GSM/GPRS modem enabling it to be used to connect external devices such as laptop PCs to the Internet or corporate intranet. The P910i is connected to the laptop using infrared, Bluetooth or cable, and will connect over the air using GPRS, HSCSD or CSD. To use this facility for Infrared or Cable, set 'Status' for the chosen connection to 'Modem' in the Control Panel.

The P910i appears to the laptop like a normal modem, having an AT command set compatible with industry de facto extensions and ETSI 07.07. Note that SMS and SMSCB are not supported over this channel. A Windows modem driver file is supplied on the Sony Ericsson PC Suite CD.
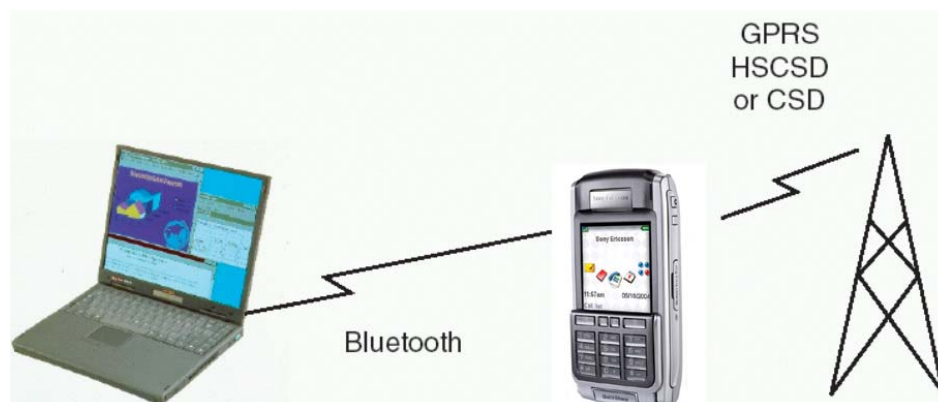
Once paired with a Bluetooth-enabled laptop, the P910i is ready to make an immediate connection to the Internet or corporate network. Because Bluetooth is wire-free and requires no line-of-sight alignment, laptop can be positioned for maximum comfort while the P910i can remain in a jacket pocket, briefcase or even be placed up to 10 metres away to get optimal reception.

Infrared may also be used to link the P910i with other devices. Range is typically up to one metre. The two infrared 'eyes' must be kept in line of sight, at an angle of no more than approximately 30 degrees.

Or a USB cable may be used.

SIM Application Toolkit

SIM Application Toolkit (SIM-AT) is a method of developing small applications for mobile phones. User interaction is via the screen and keyboard, while connectivity is provided by means of SMS and USSD transports. SIM-AT can also be used to initiate phone calls. A typical application is to provide a simple menu-based interface to value-added services provided by the mobile operator. The application is stored and distributed on the SIM card. SIM-AT offers a powerful way to deploy programs and services to users, without the need for new or upgraded equipment. All necessary set-up and programming is distributed to users over the air, directly to their phones.

The P910i supports SIM-AT according to GSM 11.14 in order to protect investment in SIM-AT based applications and to enable users to continue using the services and applications on their SIM cards. The applications are accessed from within the UI of the P910i's Phone application.

The P910i also has much richer application environments including WAP, Web, C++ and Java. These enable applications to be created with a much better UI and superior connectivity such as TCP/IP over the Internet.

SIM-AT Services supported by the P910i

Service	Description
CALL CONTROL	This will enable the SIM to allow, bar or modify a call (supplementary service operation or USSD operation).
DISPLAY TEXT	Text is displayed on the screen according to the request from the SIM application:

	Priority:	Normal, High
	Clear Message:	Automatic after delay, Wait for user.
	Alphabet:	UCS2, packed and unpacked SMS default

EVENT DOWNLOAD	The Event Download enables the ME to report on events to the SIM:

- Location Status
- Idle Screen Available
- Language Selection
- Call Connected
- Call Disconnected
- Browser Termination

GET INKEY	Request the user to enter a single character.

- 0-9 *# + only or alphabet set
- Yes/No Response
- SMS default or UCS2 character set

GET INPUT	Request the user to enter a number of characters.

- 0-9 *# + only or alphabet set
- SMS default or UCS2 character set
- Input echoed or secret
- Packed or unpacked.

LAUNCH BROWSER	The P910i will launch the integrated browser.

MORE TIME	More Time allows the SIM Toolkit more time for processing its task, if the processing takes long enough to affect normal GSM operation, and clock stop prevents processing to take place in the background.
PLAY TONE	Play supervisory tones (for example Dial tone, Busy tone) as defined in GSM 02.40.
POLL INTERVAL	Periodically, the handset sends a status command to the card to check whether the card is present. The SIM can send a poll interval command to request a certain amount of time between status commands.
POLL OFF	Cancels any previous poll interval commands.
PROFILE DOWNLOAD	Profile downloading provides a mechanism for the ME to tell the SIM its capabilities.

PROVIDE LOCAL INFORMATION — Send current known locality information to the SIM:

- MCC, MNC, LAC and Cell Identity
- IMEI
- Network Measurement Results
- Date, time and time zone
- Language Setting
- Timing Advance

REFRESH — The Refresh command enables the SIM to inform the P910i that data on the SIM has changed and the P910i needs to be updated:

- SIM Initialisation and Full File Change Notification
- File Change Notification
- SIM Initialisation and File Change Notification
- SIM Initialisation
- SIM reset

SELECT ITEM	Allows the user to select one alternative from a menu.
SEND DTMF	If there is an active call, play the requested DTMF tone(s) down the line.

SEND SHORT MESSAGE — Send an SMS containing data provided by the application.

- Packing by the ME if required

SEND SS	Send an SS request to the network.
SEND USSD	Send a USSD request to the network.

SET UP CALL — Set up a voice call:

- If not currently busy on another call
- If not currently busy on another call, with redial
- Putting all calls (if any) on hold
- Putting all calls (if any) on hold, with redial
- Disconnecting all other calls
- Disconnecting all other calls, with redial

SET UP EVENT LIST — The SIM supplies a list of events to the P910i. When one of these events occurs, the details will be provided to the SIM:

- Location Status

- Idle screen available
- Language selection
- Browser Termination
- Call connected
- Call disconnected

SET UP IDLE MODE
TEXT   The P910i displays text from the SIM on the phone's idle screen.

SET UP MENU   Define the SIM Application Menu.

SMS PP DOWNLOAD   This feature will allow data to be downloaded through the Short

                        Message channel on a card by card basis (Point to Point - PP).

SMS CB DOWNLOAD   A cell broadcast envelope broadcasts a message to all of the mobiles in a
                        particular region. The handset can forward the cell broadcast page to the SIM.
                        Normally used to target services geographically.

Symbian OS Operating System

Symbian is the company that developed the Symbian OS technology. Symbian OS is the operating system for Wireless Information Devices, and can be found in a wide range of PDA, 'communicator' and 'smartphone' designs. The Symbian OS technology delivers application and communication capabilities in a small package - it has a robust system kernel, powerful object-oriented middleware, industry-standard communication protocol suites, and an optimized implementation of Sun's Java^{TM} language. Symbian OS is the largest-selling operating system for smartphones and communicators.

The P910i is based on Symbian OS v7.0 and the established UIQ UI. Sony Ericsson and Symbian have been actively working with software developers for some time, and a range of UIQ-based applications are now available on the market. Sony Ericsson is also an active participant in developer events such as the Symbian Developer Conference and Java One.

Third party applications may make use of the communications, display and storage facilities of the P910i. Such applications may therefore be much more powerful than browser-based applications, enabling games to be faster and more exciting, for example.

The P910i supports Java-based applications. Java technology is platform-independent, portable, modular and secure. Java applications are easy to develop, deploy and maintain. Because it supports both PersonalJava^{TM} and J2ME CLDC/MIDP (see next page), the P910i is ready to run many applications written for handheld computers and mobile phones.

Applications are easily downloaded directly to the P910i using the browser, or may be installed from a connected PC.

Key applications for the consumer include games, information and entertainment. Corporate applications may be deployed, extending information access to the P910i.

Open Environment

Applications may be written in C++, Java and Visual Basic. Supported Java environments are PersonalJava^{TM} and J2ME CLDC/MIDP, both of which are optimized for quick start-up time.

C++

Developers using C++ will have access to the widest set of Sony Ericsson and Symbian Programming Interfaces among the development environments available. This enables application programs to access more features in the device.

C++ is the native Symbian OS application programming language.
C++ Development is backed up by the UIQ 2.1 SDK which provided rich C++ API documentation/build tools, and by the powerful IDE's marketed by Metrowerks (Codewarrior) and Borland (C++BuilderX).

Java

Java is a widely used and extensible programming platform, which makes the development of personalized applications and content much easier. Originally developed by Sun in 1991, Java is a programming language used to develop applications – utility programs, games, plug-ins etc. – for different hardware and software platforms. Users of Java-enabled devices can install new applications and games to make their devices more personal and adapt them to specific needs. Sony Ericsson is an active participant in the industry joint standardisation bodies that formulate the many J2ME API profiles that will shape the Java support of the many products brought to market in the coming years.

PersonalJava^{TM}

PersonalJava, also known as pJava, was the first initiative at formulating an edition of Java suited for resource constrained and mobile devices. The downsizing was accomplished by removing those APIs from a full JDK 1.1.* release that was not deemed appropriate for a mobile device. The virtual machine and Java language specification, however, still remain on level with a JDK 1.1 generation desktop implementation. Due to the 2.5 MB ROM footprint and memory requirements this runtime environment is appropriate only for more powerful mobile phones and PDAs, such as the P910i. Security-wise, PersonalJava needs to be treated similarly to a native application due to the file system access, native interfacing possibilities (JNI) and less restricted sandbox environment. PersonalJava shares the same deployment/install mechanism as Symbian OS native applications. PersonalJava represents an alternative to SymbianOS C++ for developing applications that will be used specifically on SymbianOS based devices where this runtime environment is available (such as the P800/P900/P910i).

The P910i includes Symbian's implementation of PersonalJava according to the Sun Microsystems 'PersonalJava Application Environment Specification (PJAE)' version 1.1.1, January 7, 1999

J2ME CLDC/MIDP

J2ME CLDC (Java2 Micro Edition, Connected Limited Device Configuration) is an edition of Java aimed at small resource-constrained mobile devices where the runtime environment must fit into hundreds of kilobytes of memory (as compared to the 2.5 MB ROM footprint required for a typical PersonalJava environment). This represents a more fundamental approach to accomplishing a small footprint environment where also the runtime environment and language specification has been altered in order to meet the constraints. Due to the strict environment definition, CLDC/MIDP can be implemented across a wide variety of constrained devices and, therefore has the potential for enabling true application cross-platform compatibility.

MIDP (Mobile Information Device Profile) defines a programming API that has gained wide industry acceptance and we are seeing an explosion of MIDP compliant mobile phones entering the market. A large number of applications for this environment are being produced which can work cross-platform.

The P910i supports CLDC 1.0 HI (adaptive precompilation 'Monty' VM) and MIDP 2.0.
The P910i implementation is compliant to JTWI 1.0 (JSR-185, an industry initiative for mobile devices that define a common set of J2ME capability and behaviour across products from many vendors).
The following API profiles are supported:
JTWI 1.0 including CLDC 1.0, MIDP 2.0, WMA 1.1 (JSR-120).
JSR-82 (Bluetooth excluding OBEX and Push)

New MIDP2 features in P910i are:

- Full screen support (entire screen available for graphical content when needed).
- Vibrator and backlight control can be used for enhanced game experience as well as for user notification.
- IMEI and version retrieval makes better license management possible and helps MIDlets adapt to specific behaviour of different software versions.
- JTWI 1.0 compliance assures alignment with a common feature set and user interaction across products from many vendors.
- Protection domains for Operator, Manufacturer and Trusted Third Party applications, in line with the MIDP 2 Recommended Security Policy.
  - Operator domain: Used for applications signed to Operator and Manufacturer certificates, that are loaded on the device during customization. The application may be signed to any of the Operator or Manufacturer certificates on the device. Certificates on the SIM are not supported. Permission prompting is according to the MIDP 2 Recommended Security Policy.
  - Trusted Third Party domain: Used for third party applications signed to certificates that are loaded on the device during customization. One example is the "Java Verified" programme. Permission prompting is according to the MIDP 2 Recommended Security Policy.

Visual Basic and .NET

Visual Basic is commonly used for MIS applications and is a supported environment via the AppForge user installable platform. .NET interfaces are supported. More information is available at www.SonyEricsson.com/developer.

Developer Tools

Symbian OS v7.0 UIQ 2.1 SDK

The UIQ 2.1 SDK is used to build applications for the Sony Ericsson P910 series smartphones. The SDK contains library files, documentation, sample code, tools and utilities for building P910i applications in C++ and for creating installation files of C++ and Personal Java applications. It also includes a UIQ emulator, which enables developers to emulate and test applications without the need for a physical device. Both CodeWarrior and Borland C++ BuilderX versions of the SDK are available. The SDK is a free download from Sony Ericsson Developer World at www.SonyEricsson.com/developer

Recommendations (Java development)

The UIQ SDK includes support for both Personal Java and J2ME CLDC/MIDP2.0 and can be used with other Integrated Development Environments (IDE) such as Sun ONE Studio 4 (Mobile Edition required for J2ME CLDC/MIDP and Community Edition required for Personal Java), and Borland Jbuilder®. Use these productivity tools/IDE to build the executable Java file (.JAR file) and then test it in the UIQ emulator or in the IDE's Java emulator before deploying to the real device.

Recommendations (C++ development)

To speed up development, Sony Ericsson encourages testing your C++ application in the UIQ emulator, which is part of the UIQ SDK. Symbian provides two versions of the SDK, one to be used together with Metrowerks CodeWarrior™ for Symbian OS and the other to be used together with Borland C++ BuilderX™ Mobile Edition.

To be able to emulate your application in the UIQ emulator, make sure you compile your application using one of the recommended IDE compilers.

Other Tools Support

There are a number of other tools and SDKs, available from Sony Ericsson and its partners, for development on a number of technologies on P910i, for example: MMS, Themes and DRM. For further information, visit the Sony Ericsson Developer World at www.SonyEricsson.com/developer.

Developer support

Online Developer Resources

On Sony Ericsson Developer World, developers will find all documentation and tools such as phone White Papers, Developers Guidelines, SDKs and Sony Ericsson specific APIs. The developer web site also contains discussion forums monitored by our Sony Ericsson Developer Support team, a searchable Knowledge Base of support queries and solutions, Tips and Tricks, example code etc. To stay up to date on development issues, register and subscribe to the monthly Sony Ericsson Developer Newsletter.

Sony Ericsson Developer Support

Sony Ericsson offers developers professional technical support services, as part of the Sony Ericsson Core and Core+ membership package. For more information about Core and Core+ memberships and benefits, visit www.SonyEricsson.com/developer.

Chinese Models in Detail

This section will be updated in future versions.

This section provides more information about the differences and extra features of the Chinese models, that is, the P910i Chinese and P910c, when compared to the non-Chinese models (P910i Standard and P910a).

Product Name and Languages

Market	Product Name	Default Language for UI and Dictionary	Alternative UI Language
China	P910c	Simplified Chinese (ZS)	English (EN)
Hong Kong	P910i	Traditional Chinese Hong Kong (ZH)	English (EN)
Singapore	P910i	English (EN)	Simplified Chinese (ZS)
Taiwan	P910i	Traditional Chinese Taiwan (ZT)	English (EN)

All Chinese models have both the default and alternative language stored on ROM and neither can be deleted.

There are basically two written languages of Chinese – Traditional and Simplified.

Traditional Chinese is used in Taiwan and Hong Kong.

Simplified Chinese uses a subset (~2,500 characters) of the total character set (~ 50,000 characters) and is primarily used in the People's Republic of China (PRC).

Input Methods

Market	Product Name	Keypad keys	Default Input Method	Alternative Input Method	Flip keyboard
China	P910c	Strokes, Latin	Pinyin	Strokes	QWERTY
Hong Kong	P910i	Strokes, Latin	Strokes	Pinyin	QWERTY
Singapore	P910i	Strokes, Latin	Pinyin	None	QWERTY
Taiwan	P910i	BoPoMoFo, Strokes, Latin	BoPoMoFo	Strokes	QWERTY

Strokes is an input method based on the graphical building blocks of Chinese characters.

Pinyin is way of phonetically describing a Chinese character using the Latin alphabet, according to rules that have been standardised in the PRC. For example Bei Jing, where Bei is the pronunciation of one character and Jing that of another.

BoPoMoFo is a method of describing a Chinese character using a set of approximately 40 phonetic characters. This method is also known as Zhuyin and is mainly used in Taiwan.

FC Character Input

There are two different flip designs, one with Strokes and one with BoPoMoFo characters. Latin characters (a, b, c…) are included on both. Pressing the * key enables the user to switch between available input methods.

Elements are entered with keys 1-9 using multitap or T9™ predictive text; matching Chinese characters are displayed in the candidate area. The Jog Dial may be used to assist in character selection.

This is the Strokes keypad. Note the additional symbols on keys 1-6.

FO Character Input

There are no Chinese versions of the flip keyboard. The Chinese models have QWERTY keyboards for input of Latin text.

Virtual Keyboard
Virtual keyboards are provided to enable the user to input elements. The top area is where selected characters are displayed to make up the sentence. An element display area shows the selected element(s). Candidates are displayed within a candidates area, and may be selected.

Pinyin Virtual Keyboard. Includes an elements and a candidate display area.

Strokes Virtual Keyboard. Includes a components area.

BoPoMoFo Virtual Keyboard. Includes an elements and a candidate display area.

Handwriting Recognition

The user writes text directly on to the screen. The shapes drawn persist until the character is interpreted. Simplified Chinese is supported on the P910c and Traditional Chinese on the P910i Chinese versions.

Numeric input area

Candidates area

Character input area

Switch between Chinese and English input
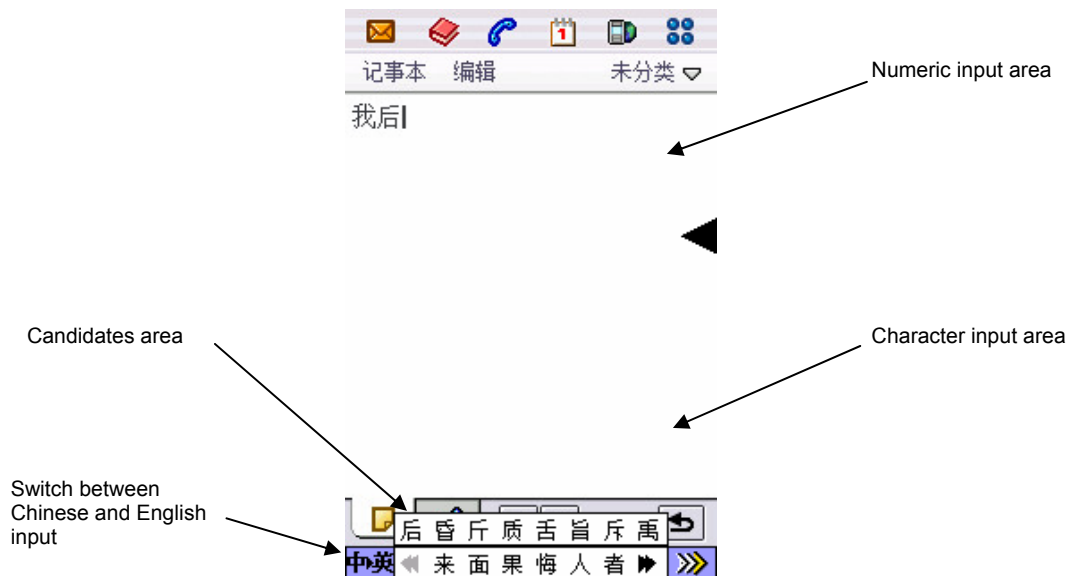
Chinese Dictionary
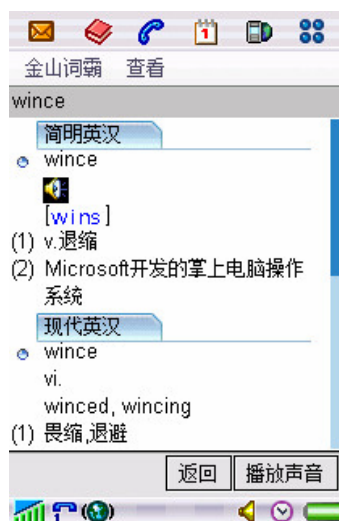
P910c (for People's Republic of China) uses a new KJava application - the Online dictionary. The Online dictionary is a client application, with the vocabulary database stored on a server. The client accesses the server via an internet connection using http. The support of human voice phonation is another new feature in this online version.
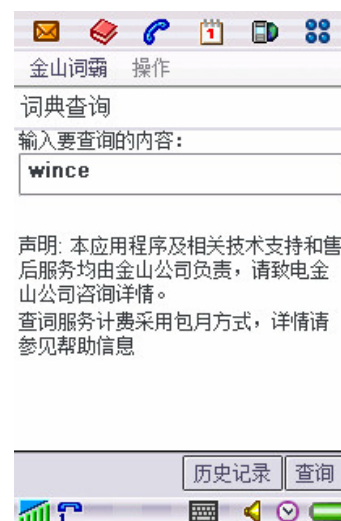
The Chinese versions of the P910i have the same dictionary as was used in the P900. Both the KJava and built-in application contain an English-Chinese and Chinese-English dictionary.

Lunar Calendar

The Chinese models have two calendars: one based on the Western solar calendar system and one based on the Chinese lunar system. Before the solar calendar was adopted, China exclusively followed a lunar to decide the times of planning, harvesting and festival occasions. Today the solar calendar is used for most practical matters of daily life but the lunar calendar is still important because it determines numerous seasonal holidays such as the Traditional New Year. The lunar calendar is available by tapping the selected year or month.
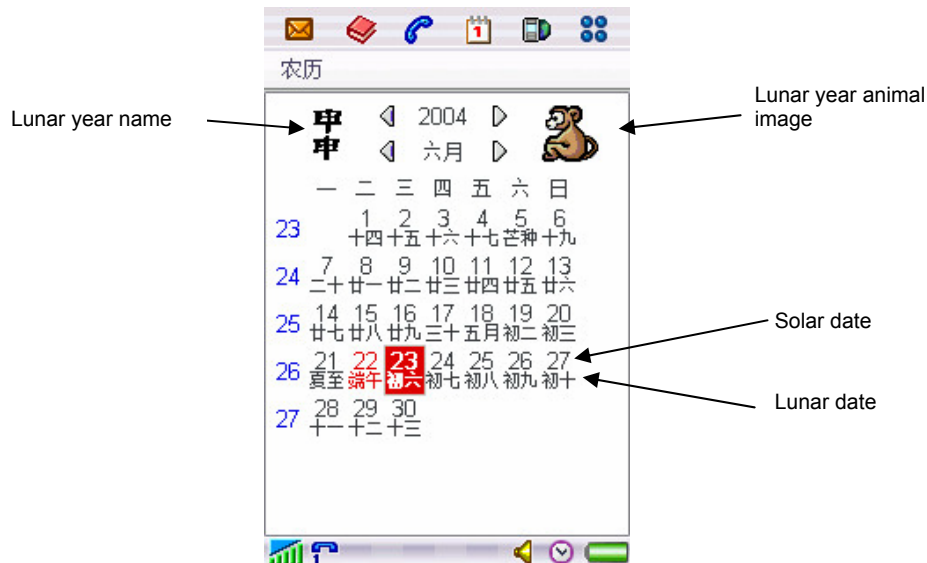
Contacts

Names written in Latin characters are sorted in a group separate from those written in Chinese.

CD-ROM Contents

The P910i is shipped with two CD-ROMs: Sony Ericsson PC Suite and the Content and Application CD.

Sony Ericsson PC Suite

The Sony Ericsson PC Suite CD-ROM includes the following:

Local Synchronisation   PC software for synchronising PIM data between the smartphone and PC applications such as Microsoft® Outlook® and Lotus® Notes® and Lotus Organizer. Described elsewhere in this paper.

Backup and Restore   Utility to back up the data from the smartphone for storage on a PC. Restore enables data to be returned to the smartphone, for example, after a software upgrade. This operation must be performed using the smartphone SyncStation.

File Manager   Enables Windows Explorer to see the smartphone as a device and the internal and Memory Stick storage as two disk drives on the device. Multimedia files may be copied between the PC and the smartphone.

Software Installer   Utility to install new applications from the PC.

Language Change Utility   Enables the user to load a different language from the CD-ROM and switch the smartphone UI to that language, assuming the specific smartphone supports this. The language files are also available at www.SonyEricsson.com/support

Dial-Up Networking Wizard Wizard for GPRS and HSCSD settings.

Drivers   Drivers for using the smartphone as a modem over Infrared, Bluetooth or Cable. USB driver for the DSS-25 SyncStation.

Content and Application CD

Note: Some of the applications listed below are trial versions that have time limits or restricted functionality.

More applications may be added, and others removed, on subsequent releases of the CD. The content may also vary between different markets and regions.

P910i Applications

DateMate™ (Trial version) - The event manager for your P910i - Never forget an important occasion again. Keep track of birthdays, anniversaries and other special events – quickly and easily, sorted and grouped together in one place, allowing you to easily contact the relevant people.

Features:

- Address book integration.

- Messaging - Easily call or send messages when an event occurs.

- Arrange your events by categories.

- Synchronize events with your device's Calendar.

- Sort events by name or date.

- View coming events easily.

Handy Expense (Trial version) is an expense tracking application for Sony Ericsson P910i. Handy Expense allows you to record business expenses as they occur, thus, reducing the amount of time spent on creating an expense report and reducing the amount of non-reported expenses. You can use Handy Expense to record your business expenses while you wait for your flight at the airport, or while you are flying to your next destination. The PC client allows you to sync your data between your Sony Ericsson P910i and your PC and then import them into MS-Excel or text file.

HP Runestone (Trial version) is a mobile printing application that provides the ability to easily print and share information wirelessly from mobile phones. The software platform enables Sony Ericsson P800, P900 and P910i mobile phones to print photos, email text (with or without jpeg image attachments), short message service (SMS), contacts and calendar day view items to Hewlett-Packard Basic Print Profile (BPP) equipped Bluetooth™ printers. This ability to print offers greater flexibility, making life easier for people who are highly mobile.

Media Viewer (Trial version – link to web page) Financial times powered by Mediabricks Media Viewer.

Mobipocket Reader *(Full version)* is a universal reader application. Reads more than 15 000 eBooks from all major US, German, France and Spanish publishers. Auto scroll. Enjoy pure wireless browsing, buying and download of any eBooks.

Photo Editor *(Trial version)* is the king of the Photo Editing applications, with its easy to use friendly interface you can modify pictures taken from your camera in few minutes and send immediately to your friend. Photo Editor is the first and only application that allows you to preview effect results on the fly. With tons of effects you can completely change the shape of your picture and it will be ready to send it over MMS, Bluetooth or infrared. With the possibilities to insert text and add clip art like moustaches, hats, clothes, mask you can personalize your picture and create your personal image of your face.

Most of the effects that you can find on your PC photo editing application can be found in this mobile edition:

Promyzer *(Trial version)* is a smartphone based electronic trading and information system offering subscribers direct access to financial markets from a Symbian OS mobile phone.

Key features:

- Real-time quotes from market worldwide

- News feeds from multiple content providers

- Runs in the background with alerts on market events

- Software upgrades and configuration OverTheAir (OTA)

SplashID *(Trial version)* safely and securely stores all of your sensitive personal information including user names, passwords, credit cards, PINs, and more.

SplashPhoto *(Trial version)* turns your Sony Ericsson P910i into a mobile digital picture frame. Simply edit and organize your favourite images with the included desktop software then sync with your handheld to view images on the go.

WorldMate Pro *(Trial version)*. Guaranteed to save you time and headaches, WorldMate Professional Edition will assist you, the frequent business traveller, in planning, managing and tracking your business travel.

With Worldwide flight schedules and flight status from OAG, weather forecasts from The Weather Channel, Day/Night map, World Clock, up-to-date currency exchange rates, metric conversions, international dialling codes, packing list, clothing measurements and more, it's an absolute must for the frequent business traveller.

Opera *(Full version)*. The small and fast Opera browser provides a full Internet experience. Equipped with Small-Screen Rendering™ technology, full HTML-enabled pages can be displayed without any horizontal scrolling.

IM+ *(Trial version)* is a complete Instant Messaging solution for your P910i. IM+ supports MSN, ICQ, AOL, Yahoo! and Jabber messaging systems. With IM+ you can communicate using encrypted messages, directly from your PC as well as from your mobile device, in real-time, cost-saving, within a group conference and many other features.

MetrO *(Full version)* is your free guide to public transport systems worldwide. More than 250 cities included, most of them with complete information (575 stations in London, 785 in New-York, 1600 in Tokyo, 839 in Paris), including suburban systems, buses, trams and ferries. Frequent updates (every month) for up-to-date information.

AvantGo *(Full version - link to web page)*. With AvantGo, you can get thousands of specially formatted brand-name web sites ("channels") on your smartphone: news, weather, sports, stock quotes, maps, movie listings, and more.

Wayfinder Mobile Navigator™ *(Trial version)* is a navigation system and route-planner with detailed maps for entire Western Europe. Wayfinder helps you find places and get route descriptions and maps. Connected to a Bluetooth GPS-receiver Wayfinder Mobile Navigator™ will turn your phone into a real-time navigation system with dynamic voice-guided turn-by-turn instructions and map directions.

AppForge Consumer Booster *(Full version)* is an operating system extension that enhances the functionality of mobile and wireless devices. When Consumer Booster is installed, users are able to run applications created with Crossfire and MobileVB.

V-Rally for Sony Ericsson *(Playable demo).* Take to the high road! V-Rally®, the legendary rally racing game is back on mobile formats. Now, you can experience the exhilarating twists and turns of V-Rally directly on your phone. No matter what you are up against, your ultimate goal is to become the world champion! The demo features one arcade level in Time Trial Mode, where you can hone your skills. The full version can be purchased and downloaded from www.handango.com/SonyEricsson.

iGo QuickPoint *(Full version - link to web page)* is a viewer tool that allows users to read and view attached MS PowerPoint files. The application is compatible with MS Office 97, 2000, and XP. The application allows a variety of modes for viewing such as slide, note and outline views of your Quickpoint files. Quickpoint also opens and saves files as a native .ppt file extension directly to the device or Memory Stick.

PC Applications	***Sony Ericsson Image Editor*** (*Full version*) lets you zoom, rotate and adjust colour, contrast and brightness settings for images of the most commonly used PC image file formats before sending them to your phone.
	PC Video player *(Full version - link to web page)*. Video player suitable for playing P910i video clips on a PC.
	MMS Home Studio *(Full version)* - For creating MMS templates on a PC.
	Adobe® Photoshop® Album 2.0 Starter Edition *(Full version)* – Finding and organizing digital images. Quickly fix common photo problems with the Single Click Fix button, eliminate red eye, or crop out unwanted areas of your photos.
MMS	*(Link to web page)*. MMS templates including copies of the templates loaded on the P910i in the factory.
Themes	*(Link to web page)*. A selection of Themes including those loaded on the P910i in the factory. See 'Personalization and Customization' for more information.
Pictures	*(Link to web page)*. A selection of images including those loaded on the P910i in the factory. See 'Personalization and Customization' for more information.
Ring Signals	*(Link to web page)*. A selection of ring signals including those loaded on the P910i in the factory. See 'Personalization and Customization' for more information.
Video	*(Link to web page)*. Includes a copy of the pre-installed 'Picnic' video clip.

P910i Consumer Package

The exact contents of the P910i package depend on the localization.

The basic contents are as follows:

A P910i with stylus

B Battery

C Travel charger

D SyncStation

E Stereo headset

F Carry case and strap

G Extra stylus

H Memory Stick PRO Duo

J Memory Stick adapter

K Flip replacement cover

L Flip replacement tool set

M User documentation package

N 2 CDs: Sony Ericsson PC Suite and Content and Application CD
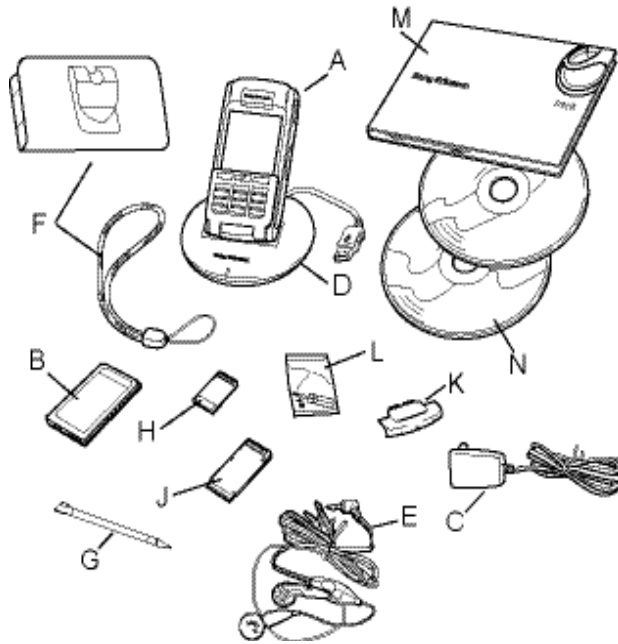
Terminology and Abbreviations

3G
Generic term for the third generation mobile systems which will offer voice and faster data services compared to today's 2G (for example GSM) and '2.5G' (for example GPRS) solutions.

3GPP
3rd Generation Partnership Project. Collaboration between a number of telecommunications standards bodies to specify 3G. 3GPP also maintains and develops the specifications for GSM.

AAC
Advanced Audio Codec.

ALS
Alternate Line Service. A system that allows a user to have more than one line allocated to a single SIM subscription.

AMR
Adaptive Multi-Rate. A variable rate speech coding (compression) method selected by the 3GPP for the 3G evolution of the GSM phones.

AU, .au
Format for audio data files.

AWT
Abstract Windowing Toolkit. A Java Graphical User Interface library.

BAE
Beatnik Audio Engine™

Bearer
Path over which data flows. Specifically in CSD and HSCSD, the type of telephony link from the GSM network to the server – PSTN or ISDN.

Bluetooth
Bluetooth wireless technology is a secure, fast, point-to-multipoint radio connection technology. It is a specification for a small-form factor, low-cost radio solution providing links between mobile computers, mobile phones and other portable handheld devices, and connectivity to the Internet. Available from the Bluetooth Special Interest Group (SIG), www.bluetooth.com.

Bookmark
A URL and header/title stored in the phone, enabling the user to go directly to a Web or WAP page.

BMP
Microsoft Windows Bitmap. A graphics format defined by Microsoft supporting 1, 4, 8 or 24 bit colour depth. No compression, so files can be large.

bps
Bits per second – rate of data flow.

CB
Cell Broadcast. Type of SMS message.

cHTML
A version of HTML optimized for small devices.

CLDC
Connected Limited Device Configuration. The J2ME 'configuration' implemented in the P910i. CLDC specifies a runtime environment with specifically limited resources, suitable for memory-constrained devices.

CLI
Calling Line Identity. Shows the number of the person calling you in your mobile phone display. The P910i will also display the name and photograph of the caller if they are in Contacts.

You can then make an informed choice as to whether or not to take the call. Bear in mind that not all numbers can be displayed. To use this service, it must be supported by your network.

COM Port
Defines a serial/RS-232 port within the Windows® environment. May be physical (COM1 port on the rear of the PC) or virtual (COM5 port communicating with a PC card modem).

CPHS Compliancy
The Common PCN Handset Specification (CPHS) is an industry standard that defines terminal and SIM functionality in addition to the standard GSM specifications.

CS
Circuit Switched. Connection from A to B which has a fixed bandwidth and is maintained over a period of time, for example, a voice telephone call.

CS-1 to CS-4
Coding Scheme. Determines the data rate per timeslot in GPRS.

CSD
Circuit Switched Data. CSD is a GSM service providing a CS data connection at a rate of 9.6 or 14.4 Kbps.

CSP
Customer Service Profile. on a SIM card will determine which menus on the phone are available to the user.

CSS
Cascading Style Sheet. A feature of browsers.

DCIM
Digital Camera IMages. The name of the root directory when storing images according to the Design rule for Camera File system (DCF) standard.

DRM
Digital Rights Management; controlling copying and distribution of contents, with respect to intellectual property rights.

DTMF
Dual Tone Multi Frequency. A method of coding digits as a combination of two audible tones.

DUN
Dial-Up Networking.

ECML
Electronic Commerce Modelling Language.

EFR
Enhanced Full Rate, speech coding. Provides better speech quality than HR or FR.

e-GSM
Extended GSM. New frequencies specified by the European Radio Communications Committee (ERC) for GSM use when additional spectrum is needed (Network-dependent). It allows operators to transmit and receive just outside GSM's core

900MHz frequency band. This extension gives increased network capability.

EMS
Enhanced Messaging Service. An extension of SMS enabling pictures, animations, sound and text formatting to be added to text messages. 3GPP has included EMS in the standards for SMS.

ETSI
European Telecommunications Standards Institute. www.etsi.org

FC, FC mode
Flip Closed – used in this document to refer to the P910i with the flip closed.

FCC
Federal Communications Commission. US government agency which regulates radio communications.

FR
Full Rate, speech coding.

FO, FO mode
Flip Open. Used in this document to refer to the P910i when the flip is open.

GGSN
Gateway GPRS Support Node

GIF
Graphics Interchange Format. Format for storing images which also supports animated images. Highly compressed by limiting the colour palette to 16 or 256 colours.

G-MIDI
General MIDI. Specifies a minimum level of performance compatibility.

GPRS
General Packet Radio Services.

GSM
Global System for Mobile Communications. GSM is the world's most widely-used digital mobile phone system, now operating in over 160 countries around the world.

GSM 900
The GSM system family includes GSM 900, GSM 1810 and GSM 1900. There are different phases

of roll-out for the GSM system and GSM phones are either phase 1 or phase 2 compliant.

GSM 1810
Also known as DCS 1810 or PCN, this is a GSM digital network working on a frequency of 1810 MHz. It is used in Europe and Asia-Pacific.

GSM 1900

Also known as PCS. Refers to a GSM system running in the 1900MHz band. Used in the USA and Canada, for instance.

HR
Half Rate, speech coding.

HSCSD
High Speed Circuit Switched Data.

HTML
HyperText Markup Language.

HTTP
HyperText Transfer Protocol.

IMAP4
Internet Message Access Protocol version 4. Used to collect email from a mail server. Has more features than POP3.

iMelody
A format for monophonic ringtones.

IrDA
Infrared Data Association.

ISDN

Integrated Services Digital Network. Can provide circuit-switched data connections in multiples of 64 Kbps.

ISP
Internet Service Provider.

J2ME
Java2 Micro Edition – an edition of the Sun Microsystems Java programming/runtime environment specifying two runtime environment 'configurations' aimed at small devices.

Java Phone
An API in Java used for interacting with a phone.

JFIF
JPEG File Interchange Format

JNI
Java Native Interface

JPEG
Joint Photographic Experts Group, best known for the .JPG format for still image compression.

JVM
Java Virtual Machine

Kbps
Kilobits per second – rate of data flow.

KVM
'Kilo' Virtual Machine

LAN
Local Area Network.

MBM
Multi Bitmap. Image file format on Symbian OS.

ME
Mobile Equipment. (Phone excluding SIM card)

MeT
Mobile Electronic Transactions. An initiative founded by Ericsson, Nokia and Motorola to establish a secure and consistent framework for mobile transactions.

MIDI
Musical Instrument Digital Interface. MIDI defines a protocol and file format which enables music to be described and stored in binary form.

MIDP
Mobile Information Device Profile. An API (or 'profile' in J2ME nomenclature) defined to enable a standard programming API for mobile devices. MIDP compliant applications execute in the restricted environment defined by the CLDC.

MIME
Multipurpose Internet Mail Extensions. A protocol defining how messages are sent on the Internet. For example, MIME is used to describe how attachments are encoded and what type of data they contain.

MMS
Multimedia Messaging Service. Logical extension of SMS and EMS, MMS defines a service enabling sound, images and video to be combined into multimedia messages.

MMS-C
MMS Service Centre

MO
Mobile Origination. For example, an SMS message sent from a mobile terminal.

MP3
MPEG Audio Layer 3. An audio compression technology that is part of MPEG-1 and MPEG-2 specifications. Commonly used to distribute music on the Internet and on portable players.

MPEG
Moving Picture Experts Group. A working group of ISO/IEC in charge of the development of standards for coded representation of digital audio and video.

MS
Mobile Station. (Phone and SIM card)

MT
Mobile Termination.

OS
Operating System, such as Symbian OS, Linux, Microsoft® Windows®.

OTA
Over-the Air Configuration. To provide settings for the phone by way of sending a message, SMS, over the network to the phone. This reduces the need for the user to configure the phone manually.

PC
Personal Computer.

PCS
Personal Communications Services, often used to describe GSM1900 networks.

PDA
Personal Digital Assistant. A handheld computer having functions such as address book, calendar etc.

PDF
Portable Document Format. A format created by Adobe for storing and distributing documents.

PDP
Packet Data Protocol.

Personal Java
An edition of Java appropriate for mobile devices such as PDAs.

Phone book
A memory in the SIM card where phone numbers can be stored and accessed by name or position.

PIM
Personal Information Management. Generic term for applications such as Contacts, Calendar, Tasks etc.

PKI
Public Key Infrastructure.

PNG
Portable Network Graphics. Format for storing images on file with data compression but without lowering of quality (loss of information).

Polyphonic
'Many sounds'. The maximum number of notes an instrument can play at the same time, commonly 16 in MIDI devices.

POP3
Post Office Protocol. Used to collect email from a mail server.

PSTN
Public Switched Telephone Network, for example, ordinary analogue phone line for speech and/or computer modem.

PTD
Personal Trusted Device. Concept in MeT

QCIF
Quarter Common Intermediate Format. A video format size of 176 x 144 lines.

QQVGA
Quarter Quarter VGA, 160 x 120 pixels.

QVGA
Quarter VGA size, typically refers to a portrait oriented screen 240 pixels wide x 320 pixels high.

RADIUS
Remote Access Dial-In Service. Facility at the ISP or corporation to manage remote data connections.

RAS
Remote Access Service.

RMF

Rich Music Format^{TM} A file format developed by Beatnik combining the compact size of MIDI files with the high quality of MP3 and WAV.

Rx

Receive

SC

Service Centre (for SMS).

SDK

Software Development Kit

Service Provider

A company that provides services and subscriptions to mobile phone users.

SIM card

Subscriber Identity Module card – a card that must be inserted in any GSM-based mobile terminal. It contains subscriber details, security information and memory for a personal directory of numbers. The card can be a small plug-in type or credit card-sized, but both types have the same functions. The P910i uses the small plug-in card.

SIM-AT

SIM Application Toolkit – a means of providing simple applications that are stored on the SIM card.

SMIL

Synchronised Multimedia Integration Language. Used by MMS to describe how media objects are to be played.

SMS

Short Message Service. Allows messages of up to 160 characters to be sent and received via the network operator's message centre to a mobile phone.

SMSCB

SMS Cell Broadcast.

SMTP

Simple Mail Transfer Protocol. Protocol used to send email from an email client via an SMTP server.

SS

Supplementary Service

SWIM

A SWIM card is a SIM card containing a WIM

T9

(Text on 9 Keys) A text input system from Tegic that adds intelligence to multi-tapping letters on a telephone keypad.

TCP/IP

Transmission Control Protocol/Internet Protocol.

TE

Terminal Equipment. Generic term for GSM terminals such as phones and PC cards.

Terminal Adaptor

Generic term for the equipment terminating a digital communications line such as an ISDN2 line. The P910i is a Terminal Adaptor since it interfaces to GSM digital data services.

TLS

Transport Layer Security. Used by Web browsers, for example.

Tx

Transmit

TTY (Teletypewriter)

A telecommunication device with a keyboard and a visual display that is used primarily by people who are deaf, hard of hearing, or have a speech disability.

UI

User Interface. Sometimes called 'Man-Machine Interface'.

UIQ

A customizable pen-based user interface for media-rich mobile phones that is based on the Symbian OS. It may be used as the basis for building an attractive and efficient UI.

URL

Uniform Resource Locator. Points to a service or information on the Internet, for example: www.ericsson.com/mms/demo

USSD

Unstructured Supplementary Services Data. Narrow-band GSM data service. For example, entering ***79*1234#** might return the stock price for stock 1234.

V.110
ETSI standard for data over an ISDN circuit.

V.120
ETSI standard for data over an ISDN circuit.

vCal; vCalendar
vCalendar defines a transport and platform-independent format for exchanging calendar and scheduling information for use in PIMs/PDAs and group schedulers. vCalendar is specified by IETF.

vCard
vCard automates the exchange of personal information typically found on a traditional business card, for use in applications such as internet mail, voice mail, Web browsers, telephony applications, call centres, video conferencing, PIMs /PDAs, pagers, fax, office equipment, and smart cards. vCard is specified by IETF.

VGA
Video Graphics Array. Graphics standard introduced by IBM, having a resolution of 640 x 480 pixels.

VPN
Virtual Private Network.

WAP
Wireless Application Protocol. Handheld devices, low bandwidth, binary coded, a deck/card metaphor to specify a service. A card is typically a unit of interaction with the user, that is, either presentation of information or request for information from the user. A collection of cards is called a deck, which usually constitutes a service.

WAV
Waveform audio. Format for storing sound.

WBMP
Wireless BitMap. Part of the WAP specifications, an image format optimized for small mobile devices.

WBXML
Wireless Binary Extensible Markup Language.

WIM
Wireless Identity Module.

WML
Wireless Markup Language. A mark-up language used for authoring services, fulfilling the same purpose as HyperText Markup Language (HTML) does on the World Wide Web (WWW). In contrast to HTML, WML is designed to fit small handheld devices.

WTLS
Wireless Transport Layer Security. Part of WAP, WTLS provides privacy, data integrity and authentication on transport layer level between two applications.

XHTML
Extensible Hypertext Markup Language

XML
Extensible Markup Language

Related Information

Links

www.SonyEricsson.com/P910i	P910i website
www.SonyEricsson.com/developer	Sony Ericsson Developer World
www.3gpp.org/	Home of the 3rd Generation Partnership Project
www.etsi.org/	Home of the European Telecommunications Standards Institute.
www.mobiletransaction.org/	MeT – Mobile electronic Transaction homepage
www.symbian.com/	Information on Symbian and Symbian OS
www.syncml.org/	SyncML homepage
www.bluetooth.com/	Home of the Bluetooth Special Interest Group
www.irda.org/	Home of the Infrared Data Association
www.wapforum.com/	Home of the WAP forum
www.imc.org/	Home of the Internet Mail Consortium
www.t9.com/	Home of the T9 predictive text input system
www.rsasecurity.com/	RSA Security provides the SecurID® two-factor authentication solution.
www.securecomputing.com/	Secure Computing provides the SafeWord™ authentication and access control solution.
java.sun.com/	The source for Java technology.
www.appforge.com	Visual Basic and .NET tools
www.borland.com/mobile/	Borland tools for mobile development (Symbian C++ and Java)
www.metrowerks.com/	Code Warrior tools for Symbian OS
www.beatnik.com/	Beatnik provides enhanced audio solutions including the RMF format.
www.memorystick.org/	Technical specifications and Supporting Companies' site for Memory Stick.
www.memorystick.com/	Information site by 'memorystick.com' Business Centre within Sony Corp.
www.opera.com	Home of the Opera browser with information and download of the latest version for P910i.

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Facts and Figures

Technical Specifications

General

Product name	P910i (Standard and Chinese) P910a (850 MHz version for North and Latin America) P910c (Chinese model for People's Republic of China)
Size	57 x 115 x 26 mm
Weight	155 grams with battery and flip
System and power class	E-GSM 900 Class 4 (P910a: GSM 850 Class 4) GSM 1800 Class 1 GSM 1900 Class 1
Antenna	Built in
Speech Coding	HR, FR, EFR supported where available, for high speech quality.
SIM Card	Small plug-in card, 3V or 5V type
Operating System	Symbian OS v7.0 Based on the 'UIQ' design.
Processor	ARM 9
Internal User storage	For settings, user data (for example images, contacts, messages) and third party applications: Up to 64 MB
Additional Storage	Memory Stick Duo, up to 128 MB size supported. Memory Stick PRO Duo, up to 1 GB size supported 32 MB Memory Stick PRO Duo supplied, plus Adapter

Performance and technical characteristics

	GSM 900/ E-GSM 900	GSM 850 (P910a only)	GSM 1800	GSM 1900
Frequency range	TX: 880 – 915 MHz RX: 925 – 960 MHz	TX: 824 – 849 MHz RX: 869 – 894 MHz	TX: 1710 – 1785 MHz RX: 1805 – 1880 MHz	TX: 1850 – 1910 MHz RX: 1930 – 1990 MHz
Channel spacing	200 kHz	200 kHz	200 kHz	200 kHz
Number of channels	174 carriers *8 (TDMA)	124 carriers *8 (TDMA)	374 carriers *8 (TDMA)	299 carriers *8 (TDMA)
Modulation	GMSK	GMSK	GMSK	GMSK
TX phase accuracy	< 5° RMS phase error (burst)	< 5° RMS phase error (burst)	< 5° RMS phase error (burst)	< 5° RMS phase error (burst)
Duplex spacing	45 MHz	45 MHz	95 MHz	80 MHz
Frequency stability	+/- 0.1 ppm	+/- 0.1 ppm	+/- 0.1 ppm	+/- 0.1 ppm
Voltage operation (nominal)	3.6 V	3.6 V	3.6 V	3.6 V

Transmitter RF power output	33 dBm Class 4 (2 W peak)	33 dBm Class 4 (2 W peak)	30 dBm Class 1 (1 W peak)	30 dBm Class 1 (1 W peak)
Transmitter output impedance	50 ohm	50 ohm	50 ohm	50 ohm
Transmitter spurious emission	< -36 dBm up to 1 GHz, < -30 dBm over 1 GHz (according to GSM spec.)	< -36 dBm up to 1 GHz, < -30 dBm over 1 GHz (according to GSM spec.)	< -36 dBm up to 1 GHz, < -30 dBm over 1 GHz (according to GSM spec.)	< -36 dBm up to 1 GHz, < -30 dBm over 1 GHz (according to GSM spec.)
Receiver sensitivity for Bit Error Rate < 2.4%	Better than -102 dBm	Better than -102 dBm	-102 dBm	-102 dBm

Battery Life

Standard battery	Talk Time: up to 13 hours Standby time: up to 400 hours

GPRS Maximum Data Rates (Kbps)

		CS-1 9.05 Kbps	CS-2 13.4 Kbps	CS-3 15.6 Kbps	CS-4 21.4 Kbps
4 + 1	Rx	36.2	53.6	62.4	85.6
	Tx	9.05	13.4	15.6	21.4

Speed achieved depends on the Coding Scheme supported by the GSM Network.

HSCSD Maximum Data Rates (Kbps)

		9.6 Kbps per timeslot	14.4 Kbps per timeslot
2 + 1	Rx	19.2	28.8
	Tx	9.6	14.4

Screen

Display type	TFT
Display size	Flip closed: 208 x 208 pixels, 40 x 40 mm Flip open: 208 x 320 pixels, 40 x 61 mm
Pixel size	0.192 mm
Colour resolution	18-bit (262,144 colours)
Screen surface	Touch-sensitive
Illumination	Variable intensity backlight

Keypad

16 keyswitches on hinged/removable flip
Jog Dial, 5-way: up, down, backwards, forwards and inwards
Browser button to switch to integrated browser
CommuniCorder button – switches to camera viewfinder and acts as shutter
On/Off button

Input

	P910i Standard and P910a	P910c/P910i Chinese
Flip Closed	Numeric keypad on flip Latin characters on number keys T9 predictive text or multitap input (selectable)	Numeric keypad on flap Stroke Pinyin Bopomofo
Flip Open	Flip keyboard, QWERTY and localized variants Touchscreen Natural character recognition On-screen virtual keyboard	Flip keyboard, QWERTY Touchscreen Chinese character recognition English character recognition Numeric character recognition Stroke Pinyin Bopomofo

Third Party Application Support

SDKs	C++ PersonalJava^{TM} J2ME^{TM} CLDC/MIDP 2.0 Visual Basic 6 and .NET
Load formats	C++, Java^{TM} or VB applications in Symbian SIS format. MIDP installation (JAR/JAD) from Browser or connected PC
Security	Support for signed applications

Telephony

Handsfree options:	Built-in Office Speakerphone Portable Handsfree Bluetooth Headset (optional accessory) Stereo Headset (optional accessory) Bluetooth car handsfree (optional accessory)
Picture Phone Book	Picture of contact displayed when making outgoing call Picture of caller displayed when incoming call CLI matches entry in Contacts. (See Contacts and Personalization for details) Pictures of contacts shown on speed dial screen when in picture mode
Personal Ringtones	Sound clips as personal ringtones and default ringtone: MP3, AMR, AU, iMelody, MIDI, RMF (Beatnik) and WAV.
Voice control	Voice Dialling Voice Answering (answer or send 'busy') Magic Word activation 40 seconds storage for approx. 50 words and contact names
Other features:	Support for calling cards Access most applications while on a phone call Flight mode, enabling P910i to be used as a PDA in locations where radio transmitters must be switched off. GSM and Bluetooth are switched off when in flight mode.
SIM-AT	SIM Application Toolkit according to GSM 11.14
USSD	Incoming and outgoing

Personal Organizer

Applications	Contacts (Address Book) Calendar (Diary) Tasks ('To-Do' list) Jotter (Text and 'ink' notes) Sound recorder (Dictaphone) Time (World Clock) Calculator (Chinese models only) English-Chinese-English Dictionary (Chinese models only) Lunar Calendar

Integrated CommuniCorder

Image Size	Still Camera:	640 x 480 pixels (VGA) 320 x 240 pixels (QVGA) 160 x 120 pixels (QQVGA)
	Video Camera	176 x 144 pixels (QCIF)
Colour depth	24 bit (16.78 million colours)	
Storage format*	Still Camera: Video Camera*	JPEG/JFIF, 3 compression levels, user-selectable. Picture: 3GPP/MPEG-4. Sound: AMR
Other features	Delay timer Brightness and Contrast settings Lighting (4 pre-set values plus automatic) Flicker-free setting (for fluorescent lighting) Backlight mode (when there is light behind the subject) Night mode Mute shutter CommuniCorder button first press switches to viewfinder – subsequent press acts as the shutter or video on/off. Jog Dial acts as mode select and alternative shutter button. On-screen icons show quality setting and remaining pictures or video clip time. Quick share feature provides rapid switch to MMS with picture or video ready to send.	

*) For details about different video storage formats of the CommuniCorder, see table on page 137.

Pictures (Image Viewer)

Formats	JPEG, BMP, GIF (including animated), MBM, PNG, WBMP
Sharing via	IR, Bluetooth, MMS, email, PC file transfer, Memory Stick

Image Editor

Usage	The Image Editor is available from the Pictures application and also when composing MMS messages.
Functions	Crop, Rotate, Rescale
Electronic ink (draw on picture)	Colour, pen size, eraser function

Video Player

File Format	.3GP (3GPP PSS), .MP4
Streaming transport	RTSP according to 3GPP
Video coding	MPEG-4 Simple Visual Profile Level 0, H263 Profile 0 Level 10
Audio coding	AMR, AAC

Music Player

File Format	AMR, AU, MP3, WAV, RMF, iMelody, M4A*, MP4** G-MIDI level 1 with 16 voices polyphony
Features	Playlists, Loop, Automatic pause on telephone call. MP3 ID3 tag details displayed.

*)M4A support for non DRM locked files

**)MP4 support for Audio MP4 files

Messages: SMS

Classes	0, 1 and 2
Bearer	GSM and GPRS
Broadcast	Basic and Extended channel
Concatenated	Up to 255 messages

Messages: EMS

Standards compliance	3GPP 23.040 Version 4
Supported objects	Sounds, Melodies, Pictures, Animations
Image editor	User may create and edit icons (16x16 and 32x32 pixels)

Messages: MMS

Image formats	GIF (Including animated), JPG, BMP, WBMP, PNG
Audio format	AMR, AU, iMelody, MIDI, WAV
Video format	.3GP (3GPP PSS), .MP4
Presentation	SMIL
Conformance	All mandatory parts of OMA Multimedia Messaging Service version 1.2

Messages: email

Incoming mail server support	POP3, IMAP4
Outgoing mail server support	SMTP
Content coding	MIME compliant
Attachment Viewers	VCard, vCal, Pictures, Video Player, Music player Document viewers as below
Other features	Automatic download of messages over GPRS 'always on' connection

Document Viewer

Document type	Location	Features	Notes
Adobe® Acrobat® (PDF)	Phone	Viewer	
Microsoft® Excel	Phone	Editor	
Microsoft® Word	Phone	Editor	
Microsoft® PowerPoint®	CD	Viewer	

Integrated Browser Technical Data

Bearer	GPRS, HSCSD, CSD
Markup Languages	HTML 3.2 (excluding features such as Frames and JavaScript that are not relevant to a small screen device) WML 1.3 WBXML XHTML Basic XHTML Mobile Profile cHTML
WAP version	2.0
Scripting	Compiled WML scripts
Style sheets	WCSS
Images	BMP, WBMP, GIF (including animated), JPEG, PNG
Security	WTLS Class 1, 2, 3; WTLS Cipher RC5 with key length 128 TLS/SSL; TLS Cipher RC4 with key length 128 SignText
Certificates	Pre-installed: Baltimore, Entrust, GlobalSign, GTA Cybertrust, RSA, Thawte and VeriSign.
WIM	WIM interface including SIM-WIM (SWIM)
Bookmarks	Yes, number only limited by available user storage
Bookmark import/export	IrDA, Bluetooth, SMS, MMS, email
Home Page	Yes
Cache	15 KB – 1 MB user-configurable; 600 KB default.
Clear cache function	Yes
Cookies	Yes
Hyperlinks	Underlined in text Image according to Style Sheet.
WAP Accounts (WAP Profiles)	Yes. Integrated with bookmarks. Quantity only limited by available user storage.
OTA Support	Ericsson/Nokia OTA WAP Forum Provisioning
User Agent header field	The HTTP User Agent header file (string) has the following format: `"SonyEricsson" model "/" release extension*` *Example*: SonyEricssonP910i/R101 Profile/MIDP_2.0 Configuration/CLDC-1.0
User Agent profiles	Yes, list of client capabilities The name of a profile has the following format: `Model release ".xml"` *Example*: www.SonyEricsson.com/UAprof/P910iR101.xml
AT&T Wireless mMode 2.0 compliant	Yes (P910a)
AT&T Wireless e-Wallet compliant	Yes (P910a)

M-Services

Compliant with M-Services specification, Phase 1

User Personalization

Background	BMP, GIF, Animated GIF, JPEG, MBM, PNG, WBMP 208 x 189 pixels in FC mode and 208 x 254 pixels in FO mode. In FO mode, only the first frame of an animated GIF is displayed.
Screen saver FC and FO	BMP, GIF, JPEG, MBM, PNG, WBMP Animated GIF supported; note that animation uses more power. 208 x 320 pixels FO image size 208 x 208 pixels visible area with flip closed (same image as FO)
Ringtones and Alarm tones	MP3, AMR, AU, iMelody, MIDI, RMF, WAV Recommended format for WAV files is PCM, 22,050Hz, 8 bit, Mono, often called 'radio quality'
Picture Phonebook	BMP, GIF, JPEG, MBM, PNG, WBMP (Picture formats that may be loaded into Contacts)
Application selection	Applications available via FC on-screen icons. Applications available from Application Picker in FO mode.

Bluetooth Wireless Technology Technical Data

Bluetooth compatibility statement	This product is manufactured to comply with the Bluetooth specification 1.1.
Coverage area	Up to 10 metres (33 feet)
Bluetooth functions	Generic Access Profile Serial Port Profile Generic Object Exchange Profile Dialup Networking Profile Object Push Profile Headset Profile Handsfree Profile File Transfer Profile
Qualified profiles	DUN-GW FT-Server GAP Generic Object Exchange Headset-AG Handsfree-AG OBEX OPP-Client OPP-Server Serial-DevA Serial-DevB

Infrared Transceiver Technical Data

Data transmission rate	Max speed between phone and IrDA device (for example PC, another phone) SIR: up to 115,200 bps

Remote Synchronisation

Data	Contacts Calendar Tasks
Bearer	HTTP
Protocol	SyncML

Local Synchronisation

Data	Contacts Calendar Tasks Jotter Text Notes email
Bearer	Bluetooth, IrDA, USB
Protocol	SyncML
PC Applications supported	Lotus Organizer® 5 and 6 Lotus Notes® 5.0, 6 and 6.5 Microsoft Outlook® 98, 2000, 2002, 2003

Sony Ericsson PC Suite

Local Synchronisation (as above)
Drag-and-drop file transfer between the P910i and the PC. (for example Word documents, JPEG images)
Backup and Restore of user data and settings
Software Installation Utility
Language Change Utility (not available for Chinese models)
Dial-Up Networking Wizard
Drivers for P910i to be used as a wireless modem
Interactive Learning Video

Security

Data protection	SIM PIN (at power on) Device Lock (at power on and/or activated by screensaver)
Browser	TLS, SSL, WTLS, Certificate handling
Third party applications	Support for signed applications
Intranet Access	SecureID® from RSA Security SafeWord from Secure Computing

Remote Configuration

Ericsson/Nokia OTA Settings specification	WAP Account (Account name and WAP Gateway information) ISP Settings (Bearer information, username, password) Bookmark (name and URL) SyncML settings MMS Settings
WAP Forum specifications	WAP Account ISP Settings
Smart Messaging Specification	ISP Settings Email account

Games

Solitaire
Chess, including multi-player games over SMS

Table - CommuniCorder video formats

Video Quality	Video codec*	Audio codec	File Type	Notes
Low *(Message Video)*	H.263 Profile 0 level 10 @ 51.8kbps, QCIF*	AMR @ 4.75 (low) or 12.2 kbps (high)	.3GP	Maximum total bitrate** = 64 kbps, maximum file size is 95 KB
Medium	MPEG4 Visual Simple Profile Level 0 @ 96kbps, QCIF*	AMR @ 4.75 (low) or 12.2 kbps (high)	.MP4	Total bitrate = 96kbps + audio bitrate
High	MPEG4 Visual Simple Profile Level 0 @ 128kbps, QCIF*	AMR @ 4.75 (low) or 12.2 kbps (high)	.MP4	Total bitrate = 128kbps + audio bitrate

*The video codec bitrates exceed the 3GPP specifications. This provides better quality than the 3GPP specifications allow, and will play on most newer devices and PC video player applications.

**Total Bit Rate = overall bitrate of audio + video.

For a suitable PC Player please refer to www.SonyEricsson.com/p900/videoplayer.